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Advanced Space Power Requirements and Techniques

Task 1: Mission Projections and Requirements

Volume III: Appendices

Prepared by

Advanced Mission Analysis Directorate
Advanced Orbital Systems Division

1 March 1978

Prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D. C.

Contract No. NASW-3078



Systems Engineering Operations

THE AEROSPACE CORPORATION

ADVANCED SPACE POWER REQUIREMENTS
AND TECHNIQUES

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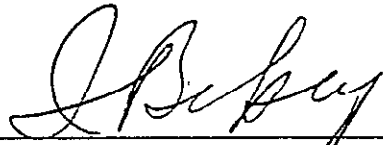
Volume III: Appendices

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FOREWORD

This is Volume III of a three-volume report. The report documents the results of Task 1 of a study entitled, "Advanced Space Power Requirements and Techniques" performed under NASA Headquarters Contract No. NASW-3078 during fiscal years 1977 and 1978. Task 2 is documented separately.

The Task 1 effort was directed by Dr. Malcolm G. Wolfe of the Advanced Applications Analysis Office. Mr. Jerome P. Mullin (Code RP) of NASA Headquarters was the NASA study director. Technical direction was also provided by Mr. Lee Holcomb of NASA Headquarters, speaking for Mr. Mullin.

The report consists of the following three volumes:

- Volume I: Technical Report
- Volume II: Classified Addendum
- Volume III: Appendices

Volume I is an unclassified volume which describes the results of the technical studies that were performed as part of the effort. The study encompassed DoD as well as NASA and civil missions and mission requirements. Volume II is a classified volume which includes data which could not be included in Volume I for national security reasons. Volume III is unclassified and contains ancillary information, such as computer printout, which was generated during the course of the study.

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Appendix I
General Study Guidelines
and Assumptions

GENERAL STUDY GUIDELINES AND ASSUMPTIONS

The following general guidelines and assumptions were used during the study:

1. Satellite descriptions were obtained, where possible, from existing documentation.
2. When documented satellite data were not available, descriptions for assumed-to-be similar satellites or best estimates were used.
3. An updated version of the Aerospace Corporation Systems Cost/Performance Model^{*} was used to synthesize satellite configurations and derive spacecraft weight and power requirements.
4. The updated Aerospace Corporation Cost Model (a derivative of the SAMSO Cost Model) was used to develop mission life cycle costs.
5. Planetary missions require dedicated flights.
6. DoD flights may not be shared with NASA or non-NASA flights.
7. North/south stationkeeping is required for all geosynchronous missions.
8. Satellites with orbit inclinations up to 57° will be launched from ETR.
9. Satellites with orbit inclinations above 57° will be launched from WTR.
10. The Shuttle delivers all high energy payloads to a circular parking orbit at 296 km (160 nmi) altitude.
11. STS IOC date out of ETR is 1980.

^{*} Systems Cost/Performance Analysis (Study 2.3) Final Report. Aerospace Report No. ATR-74(7343)-1, Vols. I, II, and III, 27 September 1974.

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Appendix II
Launch Vehicle Performance
and Cost Assumptions

LAUNCH VEHICLE PERFORMANCE AND COST ASSUMPTIONS

I. INTRODUCTION

This appendix presents data pertinent to the ground rules used for launch vehicle selection, performance, and cost estimation. These data are used as inputs to the computer program which is used to generate life cycle costs.

II. LAUNCH VEHICLE ENSEMBLES

Launch vehicle design and rocket performance computations are obviously outside the scope of this effort. Nevertheless, it is necessary to define a set of candidate launch vehicle elements in gross terms in order to generate the type of output desired by NASA. The selected launch vehicle ensembles are listed in Table II-1 together with their estimated gross payload capabilities. The payload weights represent deployment only; the costs represent launch costs only.

The candidate launch vehicle ensemble set is by no means exhaustive, but it is considered to be sufficiently comprehensive to serve the objectives of this study.

III. MISSION DESTINATION SET

For the purposes of this study, a limited number of satellite destinations were selected. The selected destinations are identified in Table II-1 and are composed of the following elements:

Table II-1. Candidate Launch System Performance and Costs

Item	Launch Vehicle Ensemble	Code	Payload Capability (kg)						Launch Vehicle Cost (\$×10 ⁶)*		
			I. Low Altitude			II. High Altitude			DoD	NASA	Civil
			(a) Low Inclination	(b) Intermed. Inclination	(c) High Inclination	(a) Elliptical	(b) Geosynch.	(c) Escape			
1	Shuttle	A	65,000	57,000	32,000	--	--	--	12	15	19
2	Shuttle + SSUS	A+C	--	--	--	--	2,500	--	13	16	20
3	Shuttle + IUS	A+D	--	--	--	6,000	5,000	--	18	21	25
4	Shuttle + OTV	A+E	--	--	--	24,000	10,000	9,000	21	24	28
5	Shuttle + OTV + SEPS	A+E +F	--	--	--	30,000	14,000	12,000	22	25	29
6	HLLV	B	1,200,000	1,100,000	600,000	--	--	--	23	23	23
7	HLLV + AOTV	B+G	--	--	--	300,000	140,000	120,000	33	33	33
8	HLLV + AOTV + SEPS	B+G +F	--	--	--	600,000	280,000	240,000	34	34	34
9	SCOUT	H	400	--	320	--	--	--	--	--	--
10	Thor/Delta	J	4,100	--	3,000	--	--	--	9	9	9
11	Atlas/Centaur	K	11,300	--	9,600	--	1,000	2,700	34	34	34
12	Titan IIIB	L	9,950	--	7,950	--	1,000	2,200	29	29	29
13	Titan IIIC	M	29,000	--	23,000	--	3,300	7,000	37	37	37
14	Titan IIID/Centaur	N	34,000	--	30,000	--	7,300	11,000	--	--	--

* Does not include amortization of RDT&E costs

1. Altitude
Low
High - elliptical, geosynchronous, and escape
2. Inclination
Low (0 to 34 deg.)
Intermediate (35 to 69 deg.)
High (70 to 108 deg.)

IV. LAUNCH VEHICLE ELEMENT SET

For the purposes of this study, a limited number of launch vehicle elements were selected. The selected launch vehicle ensembles are identified in Table II-1 and are composed of the following elements:

1. Element A
A standard Shuttle with characteristics approximating the NASA July 1976 Shuttle configuration.
2. Element B
A reusable Heavy Lift Launch Vehicle (HLLV), not defined in detail, but providing approximately 20 times the payload capability of Element A to low-earth orbit.
3. Element C
A standard expendable spinning solid upper stage having a performance capability to geosynchronous orbit of approximately half of the Inertial Upper Stage (IUS) (Element D).
4. Element D
The IUS, which is a solid propellant expendable stage with characteristics approximating the Boeing configuration of June 1977.

5. Element E

A standard Orbit Transfer Vehicle having a performance capability two times the IUS (Element D). It is approximately equivalent to the cryogenic Space Tug described in NASA baseline Tug document.

6. Element F

A Solar Electric Propulsion Stage (SEPS) similar to the configuration described by Rockwell International (RI) and used by RI in their SEPS applications studies.

7. Element G

A large reusable Orbit Transfer Vehicle, not defined in detail, but providing approximately 10 times the capability of the A+E+F configuration to geosynchronous orbit when used with the HLLV (Element B).

8. Element H

The standard SCOUT expendable launch vehicle.

9. Element J

The standard THOR/DELTA expendable launch vehicle.

10. Element K

The standard ATLAS/CENTAUR expendable launch vehicle.

11. Element L

The standard TITAN IIIB expendable launch vehicle.

12. Element M

The standard TITAN IIIC expendable launch vehicle.

13. Element N

The standard TITAN IIID/CENTAUR expendable launch vehicle.

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Appendix III

Satellite Programs 1959-1979

SATELLITE PROGRAMS 1959-1979

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
GOES-A (SMSC)	N	O	Solar Array and Battery	19/75	165
SMS-A	N	O		5/74	157
SMS-B	N	O		2/75	157
ETS-II	C	C		2/77	113
SAS-C(3)	N	O		5/75	65
SAS-B (2)	N	O		11/72	27
SAS-A (1)	N	O		12/70	27
TIP-II	D	S		1975	100
TIP-I	D	S		9/72	35
GEOS-3	N	O		4/75	
OSO-7	N	O		9/71	97
SESP-P70-1	D	S		6/71	298
STP-P72-1	D	S		10/72	135
STP-	D	S		10/74	90
S73-5	D	S		12/75	90
-6, S74-2	D	S		4/76	90
IMP-H	N	O		9/72	150
IMP-J	N	O		10/73	150
NIMBUS-6	N	O		6/75	500
NIMBUS-G	N	O		11/78	500
BSE	C	C		3/77	780
IME-M,	N	O	Solar Array and Battery	11/77	160
-H	N	O		8/78	160
-D	N	O		11/77	160

Notes

(1) N = NASA; D = DoD; C = Civil

(2) O = Observation; C = Communication; S = Support

SATELLITE PROGRAMS 1959-1979

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
OAQ-3	N	O	Solar Array and Battery	8/75	333
OSO-8	N	O		1975	464
ANIK2 /WESTAR	C	C		1972-1974	320
GMS	C	O		7/77	212
AE-C	N	O		3/74	170
AE-D	N	O		9/75	170
AE-E	N	O		11/75	170
RCA SATCOM	C	C		3/76	750
TIROS-N	C	O		12/78	1250
ITOS G-1	C	O		6/74	434
NAVSTAR	D	S	Solar Array and Battery	1977-78	524
STP-P72-2	D	S		1975	420
HEAO-A,	N	O		4/77	958
-B	N	O		6/78	1180
-C	N	O		7/79	958
VIKING 1-2	N	O		1975	620
TRANSIT	D	S		1968-73	20
AGENA	D	S		1959-73	500
VELA	D	S		1963-70	99
LES 1	D	C		1965	33
LES 2	D	C	Battery	1965	36
LES 3-4	D	C		1965	36
LES 5-6	D	C		1967 & 1968	220

Notes

(1) N = NASA; D = DoD; C = Civil

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SATELLITE PROGRAMS 1959-1979

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
LES 8-9	D	C	RTG	1975	290
DMSP	D	O	Solar Array and Battery	1975	900
IDCSP	D	C		1966-68	40
TACSAT	D	C		1969	980
SKYNET 1	D	C		1969 & 70	113
NATO II	D	C		1970 & 71	113
PROJECT A	D	O		1967	560
DSCS-II	D	C		11/71, 12/73, 5/75	535
SKYNET II	D	C		1974	260
FLTSATCOM	D	C		1977	1800
STP 71-2	D	S		1971	1400
NATO III	D	C		1976	533
INTELSAT-I	C	C		1965	45
INTELSAT-II	C	C		1966	85
INTELSAT-III	C	C		1968-70	160
INTELSAT IV	C	C		1971-75	569
INTELSAT IVA	C	C		1975	590
ANIK	C	C		1972, 73, 75	300
MARISAT	D	C		1975	350
COMSTAR-AT&T	C	C		1975	600
JAPANESE-CS	C	C	Solar Array and Battery	1977	538

Notes

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SATELLITE PROGRAMS 1959-1979

III-4

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
RCA SATCOM	C	C	Solar Array and Battery	1975	740
JAPANESE GE B.S.E.	C	C		1978	1000
SYMPHONIE 1	C	C		1974	300
ATS 1-5	N	C		1966-69	130
ATS 6	N	C		1974	645
NIMBUS 1-5	N	O		1964-72	500
SMS A-B	N	O		1974-75	200
ITOS 1-E	N	O		1970-73	350
NOAA 1-4	N	O		1970-74	350
ERTS/ LANDSAT A-B	N	O		1972-75	550
SYMPHONIE 2	C	C		1975	300
NIMBUS 1	N	O		1964	500
NIMBUS 2	N	O		1966	500
ATS 1	N	C		1966	130
Lunar Orbiter 3	N	L	Solar Array and Battery	1967	450
OSO 3	N	O		1967	43
ATS 2	N	C		1967	130
Surveyor 3	N	O		1967	90
Surveyor 4	N	O		1967	90
Lunar Orbiter 4	N	O		1967	450
Explorer 34	N	O		1967	288

Notes

(1) N = NASA; D = DoD; C = Civil

(2) O = Observation; C = Communication; S = Support

SATELLITE PROGRAMS 1959-1979

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
Mariner 5	N	O	Solar Array and Battery	1967	375
Explorer 35	N	O		1967	342
OGO 4	N	O		1967	600
Lunar Orbiter 5	N	O		1967	450
Surveyor 5	N	O		1967	90
OSO 4	N	O		1967	43
ATS 3	N	C		1967	175
Surveyor 6	N	O		1967	90
Pioneer 8	N	O		1967	500
TETR 1	N	O		1967	20
Surveyor 7	N	O		1968	90
Explorer 36	N	O		1968	45
OGO 5	N	O		1968	600
Explorer 37	N	O		1968	100
NIMBUS B/ SECOR 10	N	O/C		1968	500
Explorer 38	N	O		1968	245
Explorer 39/40	N	O		1968	5/100
ATS 4	N	C		1968	130
Pioneer 9/ TETR 2	N	O		1968	500/20
OA0 2	N	O		1968	1400
OSO 5	N	O		1969	43

Notes

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SATELLITE PROGRAMS 1959-1979

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
Mariner 6	N	O	Solar Array and Battery	1969	475
Mariner 7	N	O		1969	475
NIMBUS 3	N	O		1969	500
NIMBUS 4	N	O		1970	600
OGO 6	N	O		1969	43
PAC 1	N	C		1969	115
ATS 5	N	C		1969	130
Pioneer E/ TETR C	N	O		1969	520
ITOS-1(TIROS M)	N	O		1970	350
OSCAR 5	N	C			
OSCAR 19	N	C		1970	10
OFO-1 Radiation/ Meteoroid	N	O		1970	170
OAQ-B	N	O		1970	1000
NOAA-1	C	O		1970	350
Explorer 42 (SAS-A)	N	O		1970	27
Explorer 43 (IMPI)	N	O		1971	528
Mariner 9	N	O		1961	475
Explorer 44 (Solrad 10)	N	O		1971	100
OSO 7/TETR-D	N	O		1971	60/97
NOAA-2 (ITOS B)	C	O	Solar Array and Battery	1971	615

Notes

(1) N = NASA; D = DoD; C = Civil

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SATELLITE PROGRAMS 1959-1979

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
Explorer 45	N	O	Solar Array and Battery	1971	117
Pioneer 10	N	O		1972	
ERTS-1	N	O		1972	550
Explorer 46	N	O		1972	100
OA0 3 (Copernicus)	N	O		1972	1450
Explorer 47 (IMP-H)	N	O		1972	150
NOAA-2 (ITOS-D)/OSCAR 6	C	O		1972	615
Explorer 48 (SAS-B)	N	O		1972	27
NIMBUS 5	N	O		1972	500
Pioneer 11	N	O		1973	
Explorer 49	N	O		1973	252
ITOS-E	N	O		1973	615
Explorer 50 (IMP-J)	N	O		1973	150
NOAA 3 (ITOS-F)	C	O		1973	350
Explorer 51(AE-c)	N	O		1973	900
SMS-1	N	O		1974	212 157(EOL)
ATS-6	N	C		1974	600
Explorer 52 (HAWKEYE)	N	O	Solar Array and Battery	1974	10

Notes

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SATELLITE PROGRAMS 1959-1979

8-III

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
NOAA 4(ITOS-G)	C	C/O	Solar Array and Battery	1974	350
AMSAT-OSCAR 7	C	C		1974	10
ERTS/LANDSAT 2	N	O		1975	550
SMS-2	N	O		1975	212
GEOS-3	N	O		1975	157 (EOL)
Explorer 53	N	O		1975	150
NIMBUS 6	N	O		1975	65
OSO 8	N	O		1975	500
Viking 1	N	O		1975	464
Viking 2	N	O		1975	620
Explorer 54	N	O		1975	620
GOES 1 (SMS-c)	N	O		1975	120
Explorer 55	N	O		1975	200
LAGEOS-1	N	O		1976	128 (EOL)
NOAA-5 (ITOSH)	C	O		1976	385
Satellite Data System 2	N	C		1976	
TIP 3	D	C		1976	
AMS 1 Advanced Metsat	N	O		1976	
MARISAT 3	N	C		1976	
HEAO-A	N	O	Solar Array and Battery	1977	958

Notes

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SATELLITE PROGRAMS 1959-1979

Satellite	User ⁽¹⁾	Function ⁽²⁾	Power System Type	Launch Date	BOL Power Level (W)
VOYAGER	N	O	Solar Array and Battery	1977	523 384 (EOL)
IME-D	N	O		1977	160
IME-M	N	O		1977	160
HEAO-B	N	O		1978	1180
IME-H	N	O		1978	160
NIMBUS-G	N	O		1978	500
HEAO-C	N	- O	Solar Array and Battery	1979	958
SEASAT-A	N	O		1978	2000

Notes

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Appendix IV

Initiative Mission and Design Characteristics

NASA Mission Description: Observation

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NO1-1-1	WTR	STS	740/740/98.7	3 Axis	1.32	2	20,830	34	119	810
-2	WTR	STS	900/900/100	3 Axis	1.15	2	18,190	30	98	440
-3	ETR	STS	35810/35810/0	3 Axis	1.15	2	18,100	28	162	860
-4	WTR	STS	300/300/90	Spln	0.35	0.5	1,390	13	84	770
-5	ETR	STS	550/550/96	3 Axis	0.18	1	1,460	14	53	200
-6	ETR	STS	35810/35810/0	3 Axis	1.07	3	25,270	26	172	1010
-7	ETR	STS	35810/35810/0	3 Axis	1.05	3	24,740	26	176	1020
-8	ETR	STS	577/577/96.5	3 Axis	0.84	3	19,880	32	97	430
NO1-2-1	ETR	STS	200/200/60	Orb	7.5	7 day	1,260	--		2000
NO2-1-1	WTR	STS	700/700/87	3 Axis	3.45	3	81,550	88	277	1210
-2	WTR	STS	900/300/100	3 Axis	1.78	2	28,040	46	155	750
-3	WTR	STS	300/300/90	3 Axis	1.28	2	20,160	33	110	610
-4	ETR	STS	35810/35810/0	3 Axis	1.43	3	33,890	36	211	870
-5	ETR	STS	600/600/50	3 Axis	0.47	2	7,360	18	67	300
NO2-2-1	WTR	STS	200/200/90	Orb	1.9	7 day	320	--		475
-2	WTR	STS	200/200/90	Orb	3.0	7 day	500	--		1470

NASA Mission Description: Communication

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NC1-1-1	ETR	STS	35810/35810/0	3 Axis	2.0	5	78,840	50	320	2200
-2	ETR	STS	35810/35810/0	3 Axis	2.0	7	110,380	50	320	2700
-3	ETR	STS	35810/35810/0	3 Axis	3.5	7	193,160	85	560	3000
-4	ETR	STS	35810/35810/0	3 Axis	5.0	7	275,940	120	750	3500
NC2-1-1	ETR	STS	35810/35810/0	3 Axis	1.0	5	39,420	25	160	1360
-2	ETR	STS	35810/35810/0	3 Axis	50.0	7	2760×10^3	1100	1400	5500
NC3-1-1	ETR	STS	35810/35810/0	3 Axis	10.0	5	394×10^3	600	1050	5000
-2	ETR	STS	35810/35810/0	3 Axis	25.0	7	1380×10^3	1100	1400	6000
-3	ETR	STS	35810/35810/0	3 Axis	100.0	7	5519×10^3	2200	3000	7500
NC4-1-1	ETR	STS	35810/35810/0	3 Axis	5.0	7	275,940	120	750	3500
-2	ETR	STS	35810/35810/0	3 Axis	15.0	7	827,820	360	950	4500
NC4-2-1	ETR	STS	35810/35810/0	3 Axis	2.0	5	78,840	50	320	2200
-2	ETR	STS	35810/35810/0	3 Axis	5.0	7	275,940	120	750	3500
NC5-1-1	ETR	STS	35810/35810/0	3 Axis	10.0	7	551,900	250	900	4000
-2	ETR	STS	35810/35810/0	3 Axis	40.0	7	2208×10^3	950	1300	5500

NASA Mission Description: Support

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NS1-1-1	ETR	STS	350/350/28.5	Orb	5.0	7 day	840			11,800
-2	ETR	STS	350/350/28.5	Orb	10.0	7 day	1680			12,000
NS1-2-1	ETR	STS	500/500/55	3 Axis	5.5	10	433,620			9,000
NS2-1-1	ETR	STS	445/445/28.5	3 Axis	25.0	5	985,500			462,000
-2	ETR	STS	445/445/28.5	3 Axis	1.0	7 day	170			29,500
-3	ETR	STS	35810/35810/0	3 Axis	60.0	10	4730 x 10 ³			380,000
-4	ETR	STS	35810/35810/0	3 Axis	1.0	7 day	170			29,500
-5	ETR	STS	445/445/28.5	3 Axis	100.0	10	7334 x 10 ³			100,000
NS3-1-1	ETR	STS	445/445/28.5	3 Axis	10.0	7 day	1680			25,000
-2	ETR	STS	600/600/50	3 Axis	1.0	7 day	170			3,640
-3	ETR	STS	445/445/28.5	3 Axis	0.5	7 day	85			10,000
-4	ETR	STS	445/445/28.5	3 Axis	1.0	7 day	170			2,000
-5	ETR	STS	445/445/28.5	3 Axis	1.0	7 day	170			14,500
-6	ETR	STS	445/445/28.5	Orb	1.0	7 day	170			14,500
NS4-1-1	ETR	STS	445/445/28.5	3 Axis	25.0	7	1380 x 10 ⁴			298
-2	ETR	STS	445/445/28.5	3 Axis	250.0	7	1380 x 10 ⁴			28 x 10 ²
-3	ETR	STS	445/445/28.5	3 Axis	2 x 10 ³	7	1104 x 10 ⁵			21 x 10 ³
-4	ETR	HLLV	35810/35810/0	3 Axis	15 x 10 ³	10	1183 x 10 ⁶			97 x 10 ³
-5	ETR	HLLV	35810/35810/0	3 Axis	12 x 10 ⁵	10	9460 x 10 ⁷			71 x 10 ⁵
-6	ETR	HLLV	35810/35810/0	3 Axis	10 x 10 ⁶	30	2365 x 10 ⁹			54 x 10 ⁶

NASA Mission Description: Scientific

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NP1-1-1	ETR	STS	500/500/28.5	3 Axis	1.51	3	35,720	39	502	6650
-2	ETR	STS	463/463/28.5	3 Axis	2.70	2	42,540	69	480	5390
-3	ETR	STS	463/463/28.5	3 Axis	2.70	2	42,540	69	480	5390
-4A	ETR	STS	1 AU/28.5	Spin	0.21	2	3,340	15	123	660
-4B	ETR	STS	35810/35810/0	Spin	0.38	2	5,920	26	114	720
-5	WTR	STS	500/500/28.5	3 Axis	0.57	1	4,520	15	60	290
-6	WTR	STS	520/297/90	Spin	0.35	1	2,730	25	88	700
-7	WTR	STS	520/297/90	Spin	0.35	1	2,730	25	88	700
-8	WTR	STS	3500/3500/90	Spin	0.18	1	1,440	9	51	270
NP1-2-1	ETR	STS	400/400/28.5	Orb	6.20	7 day	1,040	--	--	9100
-2	ETR	STS	350/350/28.5	Orb	1.20	7 day	200	--	--	3160
-3	ETR	STS	300/300/28.5	Orb	0.72	7 day	120	--	--	2490
-4	ETR	STS	400/400/30	Orb	1.80	7 day	300	--	--	5860
NP2-1-1	ETR	STS	575/575/28.5	3 Axis	0.94	2	14,890	24	102	900
-2	ETR	STS	1 AU/28.5	3 Axis	0.22	1	1,730	15	97	560
-3	WTR	Delta	3500/260/90	Spin	0.31	1	2,430	22	71	340
-4	WTR	Scout	37000/1800/28.5	Spin	0.22	1	1,700	15	82	280
-5	ETR	STS	350/350/28.5	3 Axis	2.68	2	42,270	69	776	8020
NP2-2-1	ETR	STS	350/350/30	Orb	3.0	7 day	500	--	--	8170
-2	ETR	STS	375/375/56	Orb	2.9	7 day	490	--	--	5720
-3	ETR	STS	685/685/57	Orb	2.7	7 day	450	--	--	9300
-4	ETR	STS	210/210/57	Orb	3.9	7 day	660	--	--	14,900
NP3-1-1	ETR	STS	463/463/28.5	3 Axis	1.12	0.5	4,420	29	135	1500
-2	ETR	STS	463/463/28.5	3 Axis	1.12	0.5	4,420	29	135	1500
NP3-2-1	ETR	STS	370/370/28.5	Orb	3.7	7 day	620	--	--	2846
-2	ETR	STS	350/350/30	Orb	1.1	7 day	190	--	--	261
-3	ETR	STS	350/350/30	Orb	1.1	7 day	190	--	--	261
-4	ETR	STS	350/350/30	Orb	1.6	7 day	270	--	--	411
NP3-3-1	ETR	STS	500/500/55	3 Axis	5.2	10	455,520		640	9000

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NASA Mission Description: Planetary and Lunar

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NL1-1-1	ETR	TIH Centaur	N/A	3 Axis	0.57	7	31,500	N/A RTG	187	1650
-2	ETR	STS	N/A	3 Axis	1.43	1.5	16,950	37	411	4030
-3	ETR	STS	N/A	3 Axis	0.74	2.3	13,620	19	95 ^b	840
-4	ETR	STS	N/A	Spin	0.30	7	16,700	15	76	370
-5	ETR	STS	N/A	3 Axis	1.07	3	25,350	27	152	520
-6	ETR	STS	N/A	3 Axis	1.27	6.7	67,000	N/A RTG	410 ⁺	2100
-7	ETR	STS	N/A	3 Axis	0.89	3	21,100	23	165	1330
-8	ETR	STS	N/A	3 Axis	0.82	3	19,420	N/A RTG	442 ^c	1220
-9	ETR	STS	N/A	3 Axis	0.78	3	18,540	19	114 ⁺	440
-10	ETR	STS	N/A	3 Axis	0.78	3	18,540	19	118 ⁺	550
-11	ETR	STS	N/A	3 Axis	0.52	2	8,140	13	93	330
-12	ETR	STS	N/A	3 Axis	1.59	3	37,540	41	354 ⁺	3300
NL2-1-1	ETR	TIH Centaur	N/A	3 Axis	0.590	2	9,300	15	100	830

^cIncludes SEPS

Non-NASA/Non-DOD Mission Description: Outside Users

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
OBSERVATION										
CO1-1-1	WTR	STS	790/790/82	3-Axis	1.19	3	28,380	31	114	740
-2	ETR	Delta	35810/35810/0	Spin	0.44	5	17,450	31	133	620
-3	ETR	STS	35810/35810/0	Spin	0.58	5	22,970	40	171	830
CO1-2-1	WTR	STS	790/790/82	3-Axis	3.60	5	142,130	92	290	1200
CO2-1-1	WTR	STS	808/808/108	3-Axis	4.09	3	96,780	105	327	1590
CO3-1-1	WTR	STS	834/834/98.7	3-Axis	1.62	3	38,290	41	146	610
-2	WTR	STS	834/834/98.7	3-Axis	1.62	3	38,290	41	146	610
-3	ETR	STS	35810/35810/0	3-Axis	0.99	5	38,940	25	184	670
-4	ETR	STS	35810/35810/0	3-Axis	0.99	5	38,940	25	184	670
CO3-2-1	Kourou	Ariane	834/834/98.7	3-Axis	1.54	3	60,680	39	142	600
-2	Kourou	Ariane	834/834/98.7	3-Axis	1.62	3	38,290	41	146	610
-3	Tanega	N	834/834/98.7	3-Axis	0.98	3	23,230	25	86	280
-4	Tanega	N	834/834/98.7	3-Axis	0.98	3	23,230	25	86	280
-5	Kourou	Ariane	35810/35810/0	3-Axis	0.93	5	36,580	23	145	600
-6	ETR	STS	35810/35810/0	3-Axis	0.93	5	36,580	23	145	600
CO4-1-1	WTR	Delta	834/834/98.7	3-Axis	--	3	--	--	--	--
-2	WTR	Atlas F	834/834/98.7	3-Axis	1.20	3	28,470	31	105	590
-3	WTR	STS	834/834/98.7	3-Axis	1.52	3	35,960	39	127	640
CO4-2-1	ETR	Delta	35810/35810/0	Spin	--	3	--	--	--	--
-2	Kourou	Ariane	35810/35810/0	Spin	0.46	5	18,130	32	130	620
-3	ETR	Delta	35810/35810/0	Spin	--	5	--	--	--	--
-4	Tanega	N	35810/35810/0	3-Axis	0.81	5	31,960	20	125	650
-5	ETR	STS	35810/35810/0	3-Axis	0.81	5	31,960	20	125	650

Non-NASA/Non-DOD Mission Description: Outside Users (Continued)

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
COMMUNICATIONS										
CC1-1-1	ETR	A/C	35810/35810/0	Spin	1.44	5	56,890	99	259	1190
-2	ETR	STS		Spin	1.44	5	56,890	99	259	1190
-3	ETR	STS		3-Axis	1.91	7	105,320	47	312	1430
CC2-1-1	ETR	STS		3-Axis	0.98	5	38,520	24	163	790
-2	ETR	A/C		Spin/Dap	1.04	7	57,590	72	207	930
-3	ETR	STS		3-Axis	1.91	7	105,320	47	314	1460
-4	ETR	Delta		Spin	0.35	5	13,910	24	102	510
-5	ETR	Delta		3-Axis	0.94	5	37,090	23	154	560
-6	ETR	STS		3-Axis	0.96	5	37,840	24	149	560
-7	ETR	STS		Spin	0.40	5	15,820	28	108	450
-8	ETR	STS		Spin	0.59	5	23,220	41	145	620
-9	ETR	STS		Spin	0.49	5	19,220	34	126	530
-10	ETR	STS		3-Axis	1.91	7	105,320	47	314	1460
-11	ETR	STS		Spin/Dap	1.19	5	46,980	82	220	1100
-12	ETR	STS		3-Axis	1.91	7	105,320	47	314	1460
-13	ETR	STS	Spin	0.64	5	25,390	44	153	650	
-14	ETR	STS	Spin	0.41	5	16,140	28	111	480	
CC3-1-1	ETR	STS	35810/35810/0	Spin	0.42	5	16,400	29	115	490
-2	ETR	STS		Spin	0.49	5	19,220	34	126	550
-3	ETR	Delta		Spin	0.41	5	16,140	28	111	480
-4	Kourou	Ariane		Spin	0.41	5	16,140	28	111	480
-5	Kourou	Ariane		Spin	0.42	5	16,670	29	116	490
-6	ETR	Delta		Spin	0.40	5	15,610	27	108	470
-7	Kourou	Ariane		Spin	0.42	5	16,400	29	115	490
-8	Kourou	Ariane		3-Axis	1.57	7	86,390	39	237	1230
-9	Kourou	Ariane		3-Axis	1.56	7	86,330	39	237	1220
-10	Kourou	Ariane		3-Axis	0.48	5	19,030	12	84	400
-11	Kourou	Ariane		Spin	0.08	2	1,210	5	50	170
-12	Kourou	Ariane		Spin	0.36	5	14,180	25	100	420
-13	ETR	STS		Spin	0.42	5	16,400	29	115	490
-14	ETR	STS		Spin	0.47	5	18,420	32	123	530
-15	ETR	STS		3-Axis	0.48	5	19,030	12	84	400
-16	ETR	STS		3-Axis	1.20	5	47,240	30	154	710

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Non-NASA/Non-DOD Mission Description: Outside Users (Continued)

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
COMMUNICATIONS (CONT'D)										
CC3-1-17	ETR	STS	35810/35810/0	Spin	0.40	5	15,610	27	108	470
-18	ETR	STS		Spin	0.56	5	22,160	39	138	600
-19	ETR	Delta		Spin	--	5				
-20	Kourou	Ariane		Spin	0.38	5	14,810	26	102	450
-21	Kourou	Ariane		Spin	0.40	5	15,610	27	108	470
-22	Kourou	Ariane		Spin	0.42	5	16,400	29	116	500
-23	ETR	STS		Spin	0.59	5	23,220	41	145	620
-24	ETR	STS		Spin	0.62	5	24,330	43	151	640
-25	ETR	Delta		Spin	--	5				
-26	ETR	STS		Spin	0.64	5	25,390	44	160	820
-27	Tanega	N		Spin	--	5				
-28	Tanega	N		Spin	0.08	1	6,500	6	50	170
-29	ETR	Delta		Spin	--	5				
-30	Tanega	N		Spin	0.57	3.5	15,750	39	140	600
-31	ETR	Delta		Spin	--	5				
-32	Tanega	N		Spin	1.19	3	28,260	82	186	720
-33	Tanega	N		Spin	0.42	5	16,640	29	117	470
-34	ETR	Delta		Spin	--	5				
-35	ETR	STS		Spin	0.64	5	25,390	44	160	830
-36	ETR	STS		Spin	0.28	5	11,160	20	81	460
-37	ETR	STS		Spin	0.68	5	26,870	47	165	840
-38	ETR	STS		Spin	0.42	5	16,400	29	116	508
-39	ETR	STS		3-Axis	1.41	5	55,750	35	206	830
-40	ETR	STS		Spin	0.59	5	23,220	41	145	620
SUPPORT										
CS1-1-1	ETR	STS	35810/35810/0	3-Axis	4.20	5	165,470	104	555	1260
CS2-1-1	ETR	STS		Spin	0.52	5	20,570	36	131	550
-2	ETR	STS		Spin	0.62	5	24,330	43	151	640
-3	ETR	STS		3-Axis	0.76	5	29,870	19	118	630

Non-NASA/Non-DOD Mission Description: Outside Users (Continued)

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
SUPPORT (CONT'D)										
CS3-1-1	ETR	STS	834/834/28	3-Axis	5.0	7 days	840			1500
-2	ETR	STS		3-Axis	10.0	7 days	1680			1500
-3	ETR	STS		3-Axis	15.0	7 days	2520			1500
-4	ETR	STS		3-Axis	1.0	7 days	168			1750
CS3-2-1	ETR	STS		3-Axis	5.0	7 days	840			1500
-2	ETR	STS		3-Axis	10.0	7 days	1680			1500
-3	ETR	STS		3-Axis	15.0	7 days	2520			1500
-4	ETR	STS		3-Axis	1.0	7 days	168			1750
-5	ETR	STS	834/834/28	3-Axis	3.8	15 days	1368			3000
SCIENTIFIC										
CP1-1-1	ETR	STS	834/834/28	3-Axis	4.16	3	98,380	107	313	1160
CP2-1-1	ETR	Delta	35810/35810/0	3-Axis	--	3				
-2	ETR	Delta	35810/35810/0	3-Axis	--	3				
-3	WTR	Delta	20000/300/90	Spin	0.38	1	3030	26	78	350
-4	Wallops	Scout	550/550/55	Spin	--	1				
-5	WTR	Delta	900/900/90	3-Axis	0.85	3	20,140	43	124	790
-6	Kourou	Ariane	834/834/98.7	3-Axis	0.84	3	19,860	61	170	200
-7	ETR	STS	35810/35810/0	Spin	0.11	1	850	7	57	200
-8	ETR	STS	35810/35810/0	Spin	0.11	3	2530	7	62	260
-9	Kago	MU	3960/826/65.9	3-Axis	--	3				
-10	Tanaga	N	1012/990/69.7	3-Axis	--	3				
-11	Kago	MU	3074/256/31.6	3-Axis	--	3				
-12	Kago	MU	5000/350/65	3-Axis	--	3				
-13	Kago	MU	3000/250/30	3-Axis	--	3				
-14	Kago	MU	500/500/30	Spin	0.15	1	1190	8	66	210
-15	Kago	MU	500/500/30	Spin	0.16	1	1290	8	70	210
-16	Kago	MU	500/500/30	3-Axis	0.88	3	20,860	23	73	390

Appendix V

Satellite Listing

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PAGE

COMMUNICATIONS/COMMAND AND CONTROL

MC1-1-1	MC1-1-1
MC1-1-2	MC1-1-2
MC1-1-3	MC1-1-3
MC1-1-4	MC1-1-4
MC1-1-5	MC1-1-5
MC1-1-6	MC1-1-6
MC1-1-7	MC1-1-7
MC1-1-8	MC1-1-8
MC1-1-9	MC1-1-9

SUBTOTAL

ELECTRO-OPTICAL SURVEILLANCE

MO1-1-1	MO1-1-1
MO1-1-2	MO1-1-2
MO1-1-3	MO1-1-3
MO1-1-4	MO1-1-4
MO1-1-5	MO1-1-5
MO1-1-6	MO1-1-6
MO1-1-7	MO1-1-7
MO1-1-8	MO1-1-8
MO1-1-9	MO1-1-9
MO1-1-10	MO1-1-10

SUBTOTAL

RADAR SURVEILLANCE

MO2-1-1	MO2-1-1
MO2-1-2	MO2-1-2
MO2-1-3	MO2-1-3
MO2-1-4	MO2-1-4
MO2-1-5	MO2-1-5
MO2-1-6	MO2-1-6
MO2-1-7	MO2-1-7
MO2-1-8	MO2-1-8

SUBTOTAL

NAVIGATION

MS1-1-1	MS1-1-1
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SUBTOTAL

METEOROLOGY

MS2-1-1	MS2-1-1
MS2-1-2	MS2-1-2
MS2-1-3	MS2-1-3

SUBTOTAL

SPACE TECHNOLOGY PROGRAM

MS3-1-1	MS3-1-1
MS3-1-2	MS3-1-2
MS3-1-3	MS3-1-3
MS3-1-4	MS3-1-4
MS3-1-5	MS3-1-5

SUBTOTAL

DOD

TOTAL

PAGE

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1	NC1-1-1 HOTLINE
NC1-1-2	NC1-1-2 INGOVT-1
NC1-1-3	NC1-1-3 INGOVT-2
NC1-1-4	NC1-1-4 INGOVT-3

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SUBTOTAL
GOVERNMENT TO PEOPLE LINKS

NC2-1-1	NC2-1-1 VOTE I
NC2-1-2	NC2-1-2 VOTE II

SUBTOTAL
PEOPLE TO PEOPLE LINKS

NC3-1-1	NC3-1-1 PRSNL COM
NC3-1-2	NC3-1-2 TELECON-1
NC3-1-3	NC3-1-3 TELECON-2

SUBTOTAL
INTRAGOVERNMENT LINKS

NC4-1-1	NC4-1-1 MAIL-I
NC4-1-2	NC4-1-2 MAIL-II
NC4-2-1	NC4-2-1 EMRGY-1
NC4-2-2	NC4-2-2 EMRGY-2

SUBTOTAL
ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1	NC5-1-1 TV BCST-1
NC5-1-2	NC5-1-2 TV BCST-2

SUBTOTAL
PLANETARY

NL1-1-1	NL1-1-1 JUP PROBE
NL1-1-2	NL1-1-2 VOIR
NL1-1-3	NL1-1-3 MERC ORB
NL1-1-4	NL1-1-4 SAT-URAN
NL1-1-5	NL1-1-5 DCFLYBY
NL1-1-6	NL1-1-6 SO/T LNDR
NL1-1-7	NL1-1-7 MARS POLR
NL1-1-8	NL1-1-8 JUP SEPS2
NL1-1-9	NL1-1-9 ENCKE RDZ
NL1-1-10	NL1-1-10MULT-ASTR
NL1-1-11	NL1-1-11JUP SWGBY
NL1-1-12	NL1-1-12MARS SSR

SUBTOTAL
LUNAR

NL2-1-1	NL2-1-1 TBO
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PAGE
NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1	NO1-1-1 LNDST F/O
NO1-1-2	NO1-1-2 ESS
NO1-1-3	NO1-1-3 SEOS
NO1-1-4	NO1-1-4 GRAVSAT
NO1-1-5	NO1-1-5 MAGSAT B
NO1-1-6	NO1-1-6 SMIAS
NO1-1-7	NO1-1-7 HCMH 2
NO1-1-8	NO1-1-8 STEREOSAT
NO1-2-1	NO1-2-1 SPCLAB PL

SUBTOTAL
ENVIRONMENTAL MONITORING

NO2-1-1	NO2-1-1 SEASAT B
NO2-1-2	NO2-1-2 ENVIR MS
NO2-1-3	NO2-1-3 HALOE
NO2-1-4	NO2-1-4 STORMSAT
NO2-1-5	NO2-1-5 ERBSS
NO2-2-1	NO2-2-1 ACPL
NO2-2-2	NO2-2-2 SPCLAB PL

SUBTOTAL

ASTROPHYSICS

NP1-1-1	NP1-1-1 SP TLSCPE
NP1-1-2	NP1-1-2 HEAO-D
NP1-1-3	NP1-1-3 HEAO-E
NP1-1-4A	NP1-1-4A VLBI
NP1-1-4B	NP1-1-4B VLBI-B
NP1-1-5	NP1-1-5 GW DTCTR
NP1-1-6	NP1-1-6 GP B/C
NP1-1-7	NP1-1-7 ADV REL X
NP1-1-8	NP1-1-8 EXPLORER
NP1-2-1	NP1-2-1 PI SL PL
NP1-2-2	NP1-2-2 SIRTf
NP1-2-3	NP1-2-3 SUOT
NP1-2-4	NP1-2-4 IR INTFHR

SUBTOTAL

SOLAR TERRESTRIAL

NP2-1-1	NP2-1-1 SNM
NP2-1-2	NP2-1-2 OESO
NP2-1-3	NP2-1-3 EXPLR DC
NP2-1-4	NP2-1-4 EXPLR SC
NP2-1-5	NP2-1-5 LSOBSRVTY
NP2-2-1	NP2-2-1 ST S/L PL
NP2-2-2	NP2-2-2 S/S IM OB
NP2-2-3	NP2-2-3 SP S/L B2
NP2-2-4	NP2-2-4 AMPS

SUBTOTAL

PAGE

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1	NP3-1-1 BESS
NP3-1-2	NP3-1-2 VFR
NP3-2-1	NP3-2-1 LSDL
NP3-2-2	NP3-2-2 MINI-LAB
NP3-2-3	NP3-2-3 CARRY-ONL
NP3-2-4	NP3-2-4 KOSMOS
NP3-3-1	NP3-3-1 RSCH MDLE

SUBTOTAL

SPACE PROCESSING-SPACE STATION

NS1-2-1	NS1-2-1 EXTMSNVEH
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SUBTOTAL

SPACE INDUSTRIALIZATION

NS2-1-1	NS2-1-1 ESC BASE
NS2-1-2	NS2-1-2 ESCBR
NS2-1-3	NS2-1-3 ASC BASE
NS2-1-4	NS2-1-4 ASCBR
NS2-1-5	NS2-1-5 SP MF FAC

SUBTOTAL

ORBITAL OPERATIONS

NS3-1-1	NS3-1-1 LSD
NS3-1-2	NS3-1-2 SKYLAB R
NS3-1-3	NS3-1-3 TSO
NS3-1-4	NS3-1-4 SATRTRVL
NS3-1-5	NS3-1-5 SETU
NS3-1-6	NS3-1-6 LRRUS

SUBTOTAL

SATELLITE POWER

NS4-1-1	NS4-1-1 25KW MOD
NS4-1-2	NS4-1-2 250KWMOD
NS4-1-3	NS4-1-3 2.1MW MOD

NS4-1-4

NS4-1-4 15MW MOD

SUBTOTAL

TOTAL

NASA

PAGE

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1	CC1-1-1 INTLSAT-5
CC1-1-2	CC1-1-2 INTLSAT-5
CC1-1-3	CC1-1-3 INTLSAT-6

SUBTOTAL

US DOMESTIC COMMUNICATION

CC2-1-1	CC2-1-1 TORS/WSTR
CC2-1-2	CC2-1-2 COMSTAR-1
CC2-1-3	CC2-1-3 COMSTAR-2
CC2-1-4	CC2-1-4 WESTAR
CC2-1-5	CC2-1-5 RCA STCM1
CC2-1-6	CC2-1-6 RCA STCM2
CC2-1-7	CC2-1-7 MARISAT
CC2-1-8	CC2-1-8 AM SAT CP
CC2-1-9	CC2-1-9 SBS-1
CC2-1-10	CC2-1-10SBS-2
CC2-1-11	CC2-1-11PBLG SVCE
CC2-1-12	CC2-1-12IHGE XMSN
CC2-1-13	CC2-1-13HCVP BCST
CC2-1-14	CC2-1-14OTHER US

SUBTOTAL

FOREIGN COMMUNICATION

CC3-1-1	CC3-1-1 ARCOMSAT1
CC3-1-2	CC3-1-2 ARCOMSAT2
CC3-1-4	CC3-1-4 ECS-1
CC3-1-5	CC3-1-5 ECS-2
CC3-1-6	CC3-1-6 MAROTS-1
CC3-1-7	CC3-1-7 MAROTS-2
CC3-1-8	CC3-1-8 TVBS-1
CC3-1-9	CC3-1-9 TVBS-2
CC3-1-10	CC3-1-10SYMPHNY-3
CC3-1-11	CC3-1-11AMSAT
CC3-1-12	CC3-1-12APPLE
CC3-1-13	CC3-1-13INSAT-1
CC3-1-14	CC3-1-14INSAT-2
CC3-1-16	CC3-1-16PALAPA-2
CC3-1-17	CC3-1-17IRAN-1
CC3-1-18	CC3-1-18IRAN-2
CC3-1-20	CC3-1-20SIRIO-2
CC3-1-21	CC3-1-21NORDSAT-1
CC3-1-22	CC3-1-22NORDSAT-2
CC3-1-23	CC3-1-23BRZLSAT-1
CC3-1-24	CC3-1-24BRZLSAT-2
CC3-1-26	CC3-1-26NATO 3-2
CC3-1-28	CC3-1-28ETS 4
CC3-1-30	CC3-1-30COMSAT-2
CC3-1-32	CC3-1-32BSE-2
CC3-1-33	CC3-1-33ECS
CC3-1-35	CC3-1-35TELESATC

PAGE

OTHER USERS (CONTINUED)

FOREIGN COMMUNICATION (CONT.)

CC3-1-36	CC3-1-36TELESATD1
CC3-1-37	CC3-1-37TELESATD
CC3-1-38	CC3-1-38UHF
CC3-1-39	CC3-1-39CDB
CC3-1-40	CC3-1-40OTHER RGL

SUBTOTAL

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1	CO1-1-1 EMS
CO1-1-2	CO1-1-2 GOES-1
CO1-1-3	CO1-1-3 GOES-2
CO1-2-1	CO1-2-1 ALWEMIC

SUBTOTAL

EARTH AND OCEAN MONITORING

CO2-1-1	CO2-1-1 OP SEASAT
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SUBTOTAL

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1	CO3-1-1 GOVT LEO
CO3-1-2	CO3-1-2 PVT LEO
CO3-1-3	CO3-1-3 GOVT GEO
CO3-1-4	CO3-1-4 PVT GEO
CO3-2-1	CO3-2-1 SPOT-1
CO3-2-2	CO3-2-2 SPOT-2
CO3-2-3	CO3-2-3 ETS-3
CO3-2-4	CO3-2-4 EARTH OBS
CO3-2-5	CO3-2-5 ESA-GEO
CO3-2-6	CO3-2-6 OTHER GEO

SUBTOTAL

WEATHER

CO4-1-2	CO4-1-2 TIROS-2
CO4-1-3	CO4-1-3 NOAA
CO4-2-2	CO4-2-2 METEOSAT2
CO4-2-4	CO4-2-4 GMS-2
CO4-2-5	CO4-2-5 OTHER

SUBTOTAL

US DOMESTIC

CP1-1-1	CP1-1-1 MLTPR P/L
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SUBTOTAL

FOREIGN

CP2-1-3	CP2-1-3 EXOSAT
CP2-1-5	CP2-1-5 IRAS
CP2-1-6	CP2-1-6 FRENCH SC
CP2-1-7	CP2-1-7 EUROPE SC
CP2-1-8	CP2-1-8 CANADA SC
CP2-1-14	CP2-1-14ASTRO A
CP2-1-15	CP2-1-15ASTRO B
CP2-1-16	CP2-1-16JAPAN SC

SUBTOTAL

PAGE

OTHER USERS (CONTINUED)

DISASTER WARNING

CS1-1-1	CS1-1-1 DSATR WRG
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SUBTOTAL

TRAFFIC MANAGEMENT

CS2-1-1	CS2-1-1 INHARSAT1
CS2-1-2	CS2-1-2 INHARSAT2
CS2-1-3	CS2-1-3 INATSAT

SUBTOTAL

SPACE MANUFACTURING-US DOMESTIC AND FOREIGN

CS3-1-1	CS3-1-1 SPRO
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ORIGINAL PAGE 11
OF POOR QUALITY

CS3-1-2	CS3-1-2 CMDEV
CS3-1-3	CS3-1-3 CMDEPLOY
CS3-1-4	CS3-1-4 CMSVCNG
CS3-2-1	CS3-2-1 SERD
CS3-2-2	CS3-2-2 CMDEV
CS3-2-3	CS3-2-3 CMDEPLOY
CS3-2-4	CS3-2-4 CMSVCNG
CS3-2-5	CS3-2-5 SPACELAB
SUBTOTAL	

USERS TOTAL
OUTSIDE

ALL PROGRAMS
TOTAL

ORIGINAL PAGE 15
OF FOUR QUALITY

9-1

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Appendix VI

Spacecraft Design Model (SDM)

LANDSAT F/O ND1-1-1

***** SYSTEM DESCRIPTION -- DESIGN NUMBER 1*****

STABILIZATION AND CONTROL
CONFIGURATION -- PASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000 (DFG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 9660 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
COPI TABLE	32.	0.
NUMBER OF COMMANDS	64.	128.
NUMBER OF MAIN FRAME WORDS	16.	100.
MAIN FRAME SAMPLE RATE	8.	3.
MAIN FRAME WORD LENGTH	4.	2.
NUMBER OF SUBFRAMES	1250	1.0000
SUBFRAME RATE	64.	64.
NUMBER OF WORDS PER SUBFRAME		

COMMUNICATIONS
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER
CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 508.94 WATTS
TOTAL SOLAR ARRAY AREA 107.26 SQ FT
INSTALLED BATTERY CAPACITY 34.00 AMP-HR
BEGINNING OF LIFE POWER 1321.16 WATTS

VEHICLE SIZING
CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 1718.7 LBS (779.6 KG) LAUNCH WEIGHT = 1784.3 LBS (809.3 KG)
DIMENSIONS
EQUIPMENT BAY 32.1 IN. (.82 M) 53.5 IN. (1.36 M) 53.5 IN. (1.36 M)
MISSION EQUIPMENT 32.1 IN. (.82 M) 53.6 IN. (1.36 M) 53.6 IN. (1.36 M)
TOTAL SATELLITE 64.3 IN. (1.63 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 262.1 IYY = 779468.2 IZZ = 1438099.2
X-CG Y-CG Z-CG
CENTER OF GRAVITY 38.2 IN. (.97 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 400. / 400. / 98.7
MISSION LIFETIME 24.0 (MO)
MEAN MISSION DURATION 20.7 (MO)
RELIABILITY .706

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT	CODE	IDENTIFIER	1991	1992	1993	1994
EQUIPMENT	QUANTITIES		2	2	1	1

QUANTITIES 37.90 LBS² VOLUME 1.18 (FT**3)

WEIGHT 51.70 LBS
RELIABILITY .9707

RELIABILITY
IEER 10

POWER REQUIREMENT 78.9 WATT

CONFIGURATION - - MONOPROPELLANT

CONFIGURATION - - MONOPROPELLANT
EQUIPMENT CODE IDENTIFIER 816 834 906 1003 499 203 1116

EQUIPMENT	CODE	IDENTIFIER	018	034	400	1005	177	200	1110
EQUIPMENT	QUANTITIES		12	4	5	9	1	1	1

WEIGHT 108.17 LBS VOLUME 4.20 (FT**3)

DRY WEIGHT 53.23 (LBS), EXPENDABLE WEIGHT

RELIABILITY .9596

ILRR 10

503 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATT
54.93(LBS)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE	IDENTIFIER	203	263	345	403

EQUIPMENT QUANTITIES 1 1 2 1 VOLUME

WEIGHT 63.71 LBS VOLUME 1.29(F1**3)

RELIABILITY 2 .9138

ERR

POWER REQUIREMENT 63.5 WATT

COMMUNICATIONS CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227
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EQUIPMENT QUANTITIES 2 1 2 1 2 1 2
VOLUME 28 (ET##3)

WEIGHT 23.62 LBS VOLUME .28 (F1#43)
RELATIVITY 9875

RELIABILITY

IEKK*****

312
2
POWER REQUIREMENT 35.4 WATT

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 233 609 702

EQUIPMENT	QUANTITIES	2	12	2	2	1
WEIGHT	115.08 LBS					
VOLUME						

WEIGHT 117.08 LBS VOLUME 1.60 (FT**3)
HAYNES WEIGHT 71.16 (LBS) SOLAR ARRAY WEIGHT

HARNESS WEIGHT 71.6(LBS); SOLAR ARRAY WEIGHT
RELIABILITY 9336

RELIABILITY • 933

POWER DISSIPATION 669.9 WATT
74.7(LBS)

MISSION EQUIPMENT		WEIGHT		VOLUME	
		1060.00	LBS		41.90 (FT**3)

RELIABILITY .9000

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

POWER REQUIREMENT 240.0 WATT

LANDSAT F/O NO1-1-1

***** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	20.1 (FT**2),	BATTEPY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1948.6(BTU/HR),	TOTAL RADIATOR AREA	21.0 (FT**2)
HEAT PIPE	2(148.0(WATT-IN),	BATTERY HEATER POWER	90.0(BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	2038.6(BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	650.7(WATT-IN)
		AVERAGE HEAT LOAD	1425.4 (BTU/HR)

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	11.5	
HEAT PIPES	4.2	
PHASE CHANGE MATERIAL	2.9	
RADIATOR (PASSIVE)	12.7	

TOTAL	31.3	

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STRUCTURES				
SKIN THICKNESS	.019 (IN)			
STRINGER NO., THICKNESS, HT.	156. ,	3821.042 (IN),	.364 (IN)	
FRAME NO., THICKNESS, HT.	5. ,	.104 (IN),	.522 (IN)	
GRID BEAM THICKNESS	.166 (IN),	SPACING 4.675 (IN),	HEIGHT 2.337 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	71.4 (LBS)			
SOLAR ARRAY BOOM AND CRIVL WT.	27.6 (LBS)			
ADAPTER WEIGHT	65.6 (LBS)			

LANDSAT F/O NO1-1-1

* * * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	FEACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	16.5	1.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	2	16.6	.4	25.0
403	COMM D:COD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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LANDSAT F/O NO1-1-1

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	12	2.3	.0	0.0
233	BATTERY	2	26.7	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1060.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	53.2
DATA PROCESSING	63.7
COMMUNICATIONS	23.6
BATTERIES	53.5
POWER CONTROL	63.6
SOLAR ARRAY	74.7
HARNESS	71.6
STRUCTURE	118.2
SOLAR ARRAY DRIVE	12.4
THERMAL CONTROL	31.3
DEY WEIGHT	1663.8
PROPELLANT	54.9
SATELLITE ADAPTER	65.6

TOTAL LAUNCH WEIGHT 1784.3

VI-5

EARTH SURVEY SAT NO1-1-2

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 4830. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
4.
1250
64.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 458.84 WATTS
TOTAL SOLAR ARRAY AREA 93.64 SQ FT
INSTALLED BATTERY CAPACITY 30.00 AMP-HR
BEGINNING OF LIFE POWER 1153.39 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 930.4 LBS (422.0 KG) LAUNCH WEIGHT = 966.2 LBS (438.2 K

DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 31.3 IN. (.80 M) 52.2 IN. (1.33 M) 52.2 IN. (1.33 M)

MISSION EQUIPMENT 23.2 IN. (.59 M) 38.7 IN. (.98 M) 38.7 IN. (.98 M)

TOTAL SATELLITE 54.5 IN. (1.39 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 167.8 IYY = 376264.0 IZZ = 876389.1

X-CG Y-CG Z-CG

CENTER OF GRAVITY 30.4 IN. (.77 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 486.7/ 486.7/100.0

MISSION LIFETIME 24.0 (MO)

MEAN MISSION DURATION 20.7 (MO)

RELIABILITY .706

EARTH SURVEY SAT 101-1-2

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 2 2 1 1
WEIGHT 37.90 LBS VOLUME 1.18 (FT**3)
RELIABILITY .9707
IERR 10

POWER REQUIREMENT 78.9 WATT

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1112
EQUIPMENT QUANTITIES 12 4 5 9 1 1 1
WEIGHT 61.72 LBS VOLUME 3.16 (FT**3)
DRY WEIGHT 34.27 (LBS), EXPENDABLE WEIGHT
RELIABILITY .9560
IERR 10

503 701 1203 603
1 2 1 1
POWER REQUIREMENT 9.3 WATT
27.45 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 2 1
WEIGHT 62.71 LBS VOLUME 1.29 (FT**3)
RELIABILITY .9136
IERR 2

POWER REQUIREMENT 63.5 WATT

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227
EQUIPMENT QUANTITIES 2 1 2 1 2 1 2
WEIGHT 23.62 LBS VOLUME .28 (FT**3)
RELIABILITY .9875
IERR*****

312
2
POWER REQUIREMENT 35.4 WATT

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 227 609 702
EQUIPMENT QUANTITIES 2 11 2 2 1
WEIGHT 106.85 LBS VOLUME 2.00 (FT**3)
HARNESS WEIGHT 41.3 (LBS), SOLAR ARRAY WEIGHT.
RELIABILITY .9369

POWER DISSIPATION 570.2 WATT
.65.2 (LBS)

MISSION EQUIPMENT

WEIGHT 400.00 LBS VOLUME 15.83 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 190.0 WATT

VI-7

EARTH SURVEY SAT NO1-1-2

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	16.5 (FT**2),	BATTERY RADIATOR AREA	.7 (FT**2)
HEATER POWER	1588.6 (BTU/HR),	TOTAL RADIATOR AREA	17.3 (FT**2)
HEAT PIPE	15053.7 (WATT-IN),	BATTERY HEATER POWER	66.6 (BTU/HR)
HEAT PIPE LENGTH	3.4 (FT)	TOTAL HEATER POWER	1655.3 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	552.2 (WATT-IN)
		AVERAGE HEAT LOAD	1254.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	10.2
HEAT PIPES	3.6
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	10.5
TOTAL	27.1

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STRUTTER NO., THICKNESS, HT.	179.		
FRAME NO., THICKNESS, HT.	5.		
GRID BEAM THICKNESS	.122 (IN)	SPACING	3.425 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN)	CENTER	0.000 (IN)
EQUIPMENT BAY STRUCTURE WT.	60.3 (LBS)	HEIGHT	1.712 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	26.0 (LBS)	AFT	.030 (IN)
ADAPTER WEIGHT	35.8 (LBS)		

EARTH SURVEY SAT NO1-1-2

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBLR 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1112	TANK	1	2.7	.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	2	16.6	.4	25.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

6-1A

EARTH SURVEY SAT NO1-1-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	11	2.3	.0	0.0
227	BATTERY	2	23.6	.3	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	400.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	34.3
DATA PROCESSING	63.7
COMMUNICATIONS	23.6
BATTERIES	47.5
POWER CONTROL	61.3
SOLAR ARRAY	65.2
HARNESS	41.3
STRUCTURE	90.1
SOLAR ARRAY DRIVE	10.8
THERMAL CONTROL	27.1
DRY WEIGHT	902.9
PROPELLANT	27.4
SATELLITE ADAPTER	35.8

TOTAL LAUNCH WEIGHT	966.2

VI-10

SYNCH EARTH CBS SAT (SEOS) NO1-1-3

* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .260000 (DEG.)

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 19256. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = C. (TPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
6.	8.
3.	2.
1.0000	1.0000
32.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 653.84 WATTS
TOTAL SOLAR ARRAY AREA 90.14 SQ FT
INSTALLED BATTERY CAPACITY 160.00 AMP-HR
BEGINNING OF LIFE POWER 1147.67 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1917.2 LBS (824.3 KG) LAUNCH WEIGHT = 1884.4 LBS (854.8 KG)

DIMENSIONS

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	36.3 IN. (.92 M)	60.6 IN. (1.54 M)	60.6 IN. (1.54 M)
MISSION EQUIPMENT	30.5 IN. (.78 M)	50.9 IN. (1.29 M)	50.9 IN. (1.29 M)
TOTAL SATELLITE	66.9 IN. (1.70 M)		

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 274.1 IYY = 989101.9 IZZ = 1500027.7

CENTER OF GRAVITY X-CG 37.7 IN. (.96 M) Y-CG 0.0 IN. (0.00 M) Z-CG 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 24.0 (MO)
MEAN MISSION DURATION 21.3 (MO)
RELIABILITY .718

SYNCH EARTH OBS SAT (SEOS) NO1-1-3

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 2 2 1 1
WEIGHT 37.90 LBS VOLUME 1.18(FT**3)
RELIABILITY .9707
TERR 10

POWER REQUIREMENT 78.9 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 816 834 907 1003 499 203 1124
EQUIPMENT QUANTITIES 12 4 5 9 1 1 1
WEIGHT 159.21 LBS VOLUME 5.37(FT**3)
DRY WEIGHT 50.53(LBS), EXPENDABLE WEIGHT
RELIABILITY .9049
TERR 0

506 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATT
108.68(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 3 1
WEIGHT 80.51 LBS VOLUME 1.67(FT**3)
RELIABILITY .9770
TERR 2

POWER REQUIREMENT 63.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202
EQUIPMENT QUANTITIES 1 1 2 1 2 1 1
WEIGHT 37.42 LBS VOLUME 1.68(FT**3)
RELIABILITY .9862
TERR*****

--2
POWER REQUIREMENT 35.4 WAT

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 414 515 269 650 702
EQUIPMENT QUANTITIES 2 11 2 2 1
WEIGHT 215.85 LBS VOLUME 2.50(FT**3)
HARNES WEIGHT 77.7(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9421

POWER DISSIPATION 136.6 WAT
62.8(LBS)

MISSION EQUIPMENT

WEIGHT 910.00 LBS VOLUME 35.97(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 560.0 WAT

7-12

SYNCH EARTH OBS SAT (SEOS) NO1-1-3

* * * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	25.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2355.9 (BTU/HR),	TOTAL RADIATOR AREA	26.1 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.2 (FT)	TOTAL HEATER POWER	2445.9 (BTU/HR)
STORED ENERGY	123.7 (BTU)	VARIABLE CONDUCTANCE H.P.	677.3 (WATT-IN)
		AVERAGE HEAT LOAD	2516.6 (BTU/HR)

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	12.8	
HEAT PIPES	4.4	
PHASE CHANGE MATERIAL	3.1	
RADIATOR (ACTIVE)	56.0	

TOTAL	76.3	

IERR 11C0001011

STRUCTURES

SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	164.	81910.347 (IN),	.390 (IN)
FRAME NO., THICKNESS, HT.	5.	.112 (IN),	.560 (IN)
GRID BEAM THICKNESS	.169 (IN),	SPACING 4.757 (IN),	HEIGHT 2.379 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	107.8 (LBS)		
SOLAR ARRAY BOOM AND CRIVE WT.	25.6 (LBS)		
ADAPTER WEIGHT	67.3 (LBS)		

VI-13

SYNCH EARTH OBS SAT (SEOS). NO1-1-3

* * * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1615	EARTH SENSOR	1	12.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.1	.0	10.9

VI-14

SYNCH EARTH OBS SAT (SEOS) NO1-1-3

* * * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
414	DISCHGE REGULATOR	2	9.7	.2	9.0
515	SHUNT REGULATOR	11	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	910.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	50.5
DATA PROCESSING	80.5
COMMUNICATIONS	37.4
BATTERIES	142.6
POWER CONTROL	73.3
SOLAR ARRAY	62.8
HARNESS	77.7
STRUCTURE	149.1
SOLAR ARRAY DRIVE	10.4
THERMAL CONTROL	76.3
OPY WEIGHT	1708.5
PROPELLANT	108.7
SATELLITE ADAPTER	67.3

TOTAL LAUNCH WEIGHT 1884.4

V1-15

GRAVSAT NO1-1-4

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
CONFIGURATION -- THREE AXIS MASS EXPULSION
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 87058. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.1 (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	64.	0.
MAIN FRAME SAMPLE RATE	100.	0.
MAIN FRAME WORD LENGTH	13.	0.
NUMBER OF SUBFRAMES	5.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 128.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER
CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 146.94 WATTS
TOTAL SOLAR ARRAY AREA 59.48 SQ FT
INSTALLED BATTERY CAPACITY 8.00 AMP-HR
BEGINNING OF LIFE POWER 351.85 WATTS

VEHICLE SIZING
CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 1630.3 LBS (739.5 KG) LAUNCH WEIGHT = 1694.0 LBS (768.4 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 57.2 IN. (1.45 M) 95.3 IN. (2.42 M) 95.3 IN. (2.42 M)
MISSION EQUIPMENT 19.2 IN. (.49 M) 32.0 IN. (.81 M) 32.0 IN. (.81 M)
TOTAL SATELLITE 76.4 IN. (1.94 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 421.4 IYY = 1633230.3 IZZ = 1633230.3
X-CG Y-CG Z-CG
CENTER OF GRAVITY 31.7 IN. (.80 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 160.1/ 160.1 90.0
MISSION LIFETIME 6.0 (MO)
MEAN MISSION DURATION 5.6 (MO)
RELIABILITY .945

VI-16

GRAVSAT NO1-1-4

* * * * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - THREE AXIS MASS EXPULSION

EQUIPMENT CODE IDENTIFIER	1501	1601	1413	1718	1803
EQUIPMENT QUANTITIES	1	2	1	1	1
WEIGHT	52.30 LBS				
VOLUME				1.23(FT**3)	
RELIABILITY		.9743			
TERR	0				

POWER REQUIREMENT 56.0 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1015	499	203	1118
EQUIPMENT QUANTITIES	6	2	5	9	1	1	7
WEIGHT	775.77 LBS						
VOLUME					15.92(FT**3)		
DRY WEIGHT	241.89(LBS)						
EXPENDABLE WEIGHT							
RELIABILITY		.9822					
TERR	11						

536	701	1203	603
1	1	1	1
POWER REQUIREMENT			
537.88(LBS)			

1.0 WATT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	406
EQUIPMENT QUANTITIES	1	1
WEIGHT	19.93 LBS	
VOLUME		.28(FT**3)
RELIABILITY		.9928
TERR	1	

POWER REQUIREMENT 8.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603
EQUIPMENT QUANTITIES	1	1	1	1	2	1
WEIGHT	14.87 LBS					
VOLUME					.19(FT**3)	
RELIABILITY		.9913				
TERR	*****					

POWER REQUIREMENT 9.5 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	103	204	303	1202
EQUIPMENT QUANTITIES	6	2	2	1
WEIGHT	60.90 LBS			
VOLUME				1.31(FT**3)
HARNESS WEIGHT		84.8(LBS)		
SOLAR ARRAY WEIGHT				
RELIABILITY		.9905		

POWER DISSIPATION 187.0 WATT
29.2(LBS)

MISSION EQUIPMENT

WEIGHT	225.00 LBS		
VOLUME		8.91(FT**3)	
RELIABILITY		.9000	

POWER REQUIREMENT 60.0 WATT

VI-17

GRAVSAT NO1-1-4

***** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	6.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER,	567.0 (BTU/HR),	TOTAL RADIATOR AREA	7.4 (FT**2)
HEAT PIPE	8310.3 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	682.0 (BTU/HR)
STORER ENERGY	97.6 (BTU)	VARIABLE CONDUCTANCE H.P.	988.2 (WATT-IN)
		AVERAGE HEAT LOAD	494.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	19.9
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	2.4
RADIATOR (PASSIVE)	3.9
TOTAL	31.3

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.018 (IN)			
SPRINGER NO., THICKNESS, HI.	211.		3184.862 (IN),	.476 (IN)
FRAME NO., THICKNESS, HT.	5.		.137 (IN),	.684 (IN)
GRID BEAM THICKNESS	.160 (IN),	SPACING	4.504 (IN),	HEIGHT 2.252 (IN)
ENCLOSURE THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	253.7 (LBS)			
SOLAR ARRAY BODY AND DRIVE WT.	15.2 (LBS)			
ADAPTER WEIGHT	63.7 (LBS)			

VI-18

GRAVSAT NO1-1-4

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	1	10.0	.1	4.0
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	PATE INTEGE GYRO	1	9.6	.2	32.0
1803	FARTH SENSOR	1	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1015	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	7	10.2	1.3	0.0
536	TANK	1	110.0	4.5	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMD DECOD+DISTR	1	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-19

GRAVSAT NO1-1-4

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
204	BATTERY	2	8.6	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	225.6
STABILITY AND CONTROL	43.3
AUXILIARY PROPULSION	241.9
DATA PROCESSING	19.9
COMMUNICATIONS	14.9
BATTERIES	17.2
POWER CONTROL	43.7
CONVERTERS	10.0
SOLAR ARRAY	29.2
HARNESS	84.8
STRUCTURE	331.3
THERMAL CONTROL	31.3
DRY WEIGHT	1092.4
PROPELLANT	537.9
SATELLITE ADAPTER	63.7

TOTAL LAUNCH WEIGHT 1694.0

VI-20

MAGSAT-B NO1-1-5

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .500000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 6055. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU,
COMPUTER OPERATIONS RATE = 0. (IPS)

CPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.1
256.	0.
13.	0.1
8.	0.1
18.	0.
1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 81.51 WATTS
TOTAL SOLAR ARRAY AREA 60.59 SQ FT
INSTALLED BATTERY CAPACITY 6.00 AMP-HR.
BEGINNING OF LIFE POWER 184.80 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT	LAUNCH WEIGHT
433.1 LBS (196.4 KG)	450.9 LBS (204.5 KG)
DIMENSIONS	HEIGHT
EQUIPMENT BAY 40.8 IN. (1.04 M)	68.0 IN. (1.73 M)
MISSION EQUIPMENT 12.8 IN. (.32 M)	21.3 IN. (.54 M)
TOTAL SATELLITE 53.6 IN. (1.36 M)	21.3 IN. (.54 M)
MOMENTS OF INERTIA (SLUGS*FT**2)	IXX = 55.6 IYY = 252242.6
	IZZ = 252242.6

X-CG

CENTER OF GRAVITY 28.6 IN. (.73 M)

Y-CG

0.0 IN. (0.00 M)

Z-CG

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 297.7 297.7 96.0
MISSION LIFETIME 12.0(MO)
MEAN MISSION DURATION 10.8(MO)
RELIABILITY .738

VI-21

MAGSAT-B NO1-1-5

* * SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413
EQUIPMENT QUANTITIES	1	1	1	1	1	1
WEIGHT	32.05 LBS				1.29(FT**3)	
RELIABILITY		.9636				
IERR	0					

POWER REQUIREMENT 10.4 WATT

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1116
EQUIPMENT QUANTITIES	6	2	4	9	1	1	1
WEIGHT	89.43 LBS				3.80(FT**3)		
DRY WEIGHT	53.03(LBS)						
RELIABILITY		.9078					
IERR	11						

506	701	1203	603
1	1	1	1
POWER REQUIREMENT			
36.40(LBS)			

1.0 WATT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403
EQUIPMENT QUANTITIES	1	1
WEIGHT	21.18 LBS	
RELIABILITY		.9933
IERR	1	

VOLUME .39(FT**3)

POWER REQUIREMENT

10.5 WATT

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603
EQUIPMENT QUANTITIES	1	1	1	1	1	1
WEIGHT	13.37 LBS					
RELIABILITY		.9565				
IERR	*****					

VOLUME .17(FT**3)

POWER REQUIREMENT

19.5 WATT

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	103	202	303	1202
EQUIPMENT QUANTITIES	3	2	2	1
WEIGHT	50.07 LBS			
HARNESS WEIGHT		21.1(LBS)		
RELIABILITY		.9862		

VOLUME 1.05(FT**3)

POWER DISSIPATION
29.8(LBS)

90.3 WATT

MISSION EQUIPMENT

WEIGHT	66.00 LBS		
RELIABILITY		.9000	

VOLUME

2.62(FT**3)

POWER REQUIREMENT

40.0 WATT

VI-22

* * * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	3.6 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	299.9(BTU/HR),	TOTAL RADIATOR AREA	4.9 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	122.2(BTU/HR)
HEAT PIPE LENGTH	3.3 (FT)	TOTAL HEATER POWER	422.1(BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	693.1(WATT-IN)
		AVERAGE HEAT LOAD	278.0 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	12.0
HEAT PIPES	3.5
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	2.3
TOTAL	19.5

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.009 (IN)		
STRINGER NO., THICKNESS, HT.	253.	3558.384 (IN),	.284 (IN)
FRAME NO., THICKNESS, HT.	5.	.081 (IN),	.407 (IN)
GRID BEAM THICKNESS	.080 (IN),	SPACING 2.240 (IN),	HEIGHT 1.120 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	57.1 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	17.8 (LBS)		

V1-23

MAGSAT-B NO1-1-5

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.5
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.5
603	DIPLEXER	1	3.1	.0	1.0

V1-24

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	N ₁	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	3	4.2	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	66.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	13.4
BATTERIES	19.0
POWER CONTROL	31.1
CONVERTERS	15.9
SOLAR ARRAY	29.8
HARNESS	21.1
STRUCTURE	90.5
THERMAL CONTROL	19.5
DRY WEIGHT	396.7
PROPELLANT	36.4
SATELLITE ADAPTER	17.8

TOTAL LAUNCH WEIGHT	450.9
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VI-25

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 52857. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
3.
1.0000
32.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE-MOUNTED SOLAR ARRAY
POWER REQUIREMENT 742.18 WATTS
TOTAL SOLAR ARRAY AREA 83.91 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 1068.41 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 2142.8 LBS (972.0 KG) LAUNCH WEIGHT = 2223.3 LBS (1008.5 KG)
DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 40.6 IN. (1.03 M) 67.6 IN. (1.72 M) 67.6 IN. (1.72 M)
MISSION EQUIPMENT 31.5 IN. (.80 M) 52.5 IN. (1.33 M) 52.5 IN. (1.33 M)
TOTAL SATELLITE 72.1 IN. (1.83 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 357.9 IYY = 1454584.4 IZZ = 1939704.0

CENTER OF GRAVITY 39.4 IN. (1.00 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)
X-CG Y-CG Z-CG

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 31.9 (MO)
RELIABILITY .1713

VI-26

346

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303			
EQUIPMENT QUANTITIES	2	2	2	2			
WEIGHT	56.40 LBS				VOLUME	1.77(FT**3)	POWER REQUIREMENT 78.9 WATT
RELIABILITY			.9946				
IERR	10						

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	907	1003	499	203	1130	511	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	2	1	2	1	1
WEIGHT	390.92 LBS				VOLUME	10.46(FT**3)		POWER REQUIREMENT 0.3 WATT			
DRY WEIGHT	92.60(LBS)				EXPENDABLE WEIGHT	298.32(LBS)					
RELIABILITY			.9050								
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	403
EQUIPMENT QUANTITIES	1	1	1
WEIGHT	30.11 LBS		VOLUME .54(FT**3)
RELIABILITY		.9700	POWER REQUIREMENT 13.5 WATT
IERR	2		

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603	202	312
EQUIPMENT QUANTITIES	1	1	2	2	3	1	1	2
WEIGHT	42.84 LBS		VOLUME	1.75(FT**3)		POWER REQUIREMENT 35.4 WATT		
RELIABILITY			.9897					
IERR	*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	412	515	269	650	702
EQUIPMENT QUANTITIES	2	10	2	2	1
WEIGHT	226.98 LBS		VOLUME	2.74(FT**3)	POWER DISSIPATION 125.3 WATT
HARNESS WEIGHT		92.9(LBS)	SOLAR ARRAY WEIGHT	58.4(LBS)	
RELIABILITY		.9167			

MISSION EQUIPMENT

WEIGHT	1000.00 LBS	VOLUME	39.53(FT**3)	POWER REQUIREMENT 500.0 WATT
RELIABILITY		.9000		

V1-27

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	21.4 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER,	2027.4 (BTU/HR),	TOTAL RADIATOR AREA	22.4 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.5 (FT)	TOTAL HEATER POWER	2117.4 (BTU/HR)
STORED ENERGY	106.7 (BTU)	VARIABLE CONDUCTANCE H.P.	730.1 (WATT-IN)
		AVERAGE HEAT LOAD	2141.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	14.6
HEAT PIPES	4.7
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	13.6
TOTAL	35.6

IERR 11C0001011

STRUCTURES			
SKIN THICKNESS	.021 (IN)		
STINGER NO., THICKNESS, HT.	165.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.433 (IN)
GRID BEAM THICKNESS	.186 (IN),	.124 (IN),	.621 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	5.236 (IN),	2.618 (IN)
EQUIPMENT RAY STRUCTURE WT.	151.7 (LBS)	0.000 (IN),	.030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	24.9 (LBS)		
ADAPTER WEIGHT	80.5 (LBS)		

VI-28

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	4.6	.2	1.0
2203	CONTROL ELECTRONICS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
618	THRUSTER	16	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATOR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
511	TANK	1	11.5	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-29

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	10	2.3	.0	0.0
260	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	92.6
DATA PROCESSING	30.1
COMMUNICATIONS	42.0
BATTERIES	142.6
POWER CONTROL	84.4
SOLAR ARRAY	58.4
HARNESS	92.9
STRUCTURE	196.9
SOLAR ARRAY DRIVE	9.7
THERMAL CONTROL	35.6
DRY WEIGHT	1844.5
PROPELLANT	298.3
SATELLITE ADAPTER	80.5

TOTAL LAUNCH WEIGHT	2223.3

V1-30

HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * *

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DFG.)

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 48053. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE
NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA	MISSION EQUIPMENT DATA
32.	0.
64.	129.
16.	100.
8.	8.
3.	2.
1.0000	1.0000
32.	64.

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 726.58 WATTS
TOTAL SOLAR ARRAY AREA 82.15 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 1045.95 WATTS

VEHICLE SIZING
CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 2170.0 LBS (984.3 KG) LAUNCH WEIGHT = 2251.6 LBS (1021.3 KG)
DIMENSIONS
EQUIPMENT BAY 41.0 IN. (1.04 M) 68.4 IN. (1.74 M) 68.4 IN. (1.74 M)
MISSION EQUIPMENT 31.3 IN. (.80 M) 52.5 IN. (1.33 M) 52.5 IN. (1.33 M)
TOTAL SATELLITE 72.6 IN. (1.84 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 363.0 IYY = 1491167.9 IZZ = 1962455.5
X-CG Y-CG Z-CG
CENTER OF GRAVITY 39.5 IN. (1.00 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 31.5 (MO)
RELIABILITY .721

✓1-31

HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

* * * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24(FT**3)

RELIABILITY .9675

IERR 10

POWER REQUIREMENT

78.9 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130 509 701 1203 603

EQUIPMENT QUANTITIES 18 6 5 9 2 1 2 1 2 1 1

WEIGHT 369.24 LBS VOLUME 10.45(FT**3)

DRY WEIGHT 98.03(LBS), EXPENDABLE WEIGHT

RELIABILITY .9468

IERR 1

POWER REQUIREMENT

.3 WATT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 3 1

WEIGHT 80.51 LBS VOLUME 1.67(FT**3)

RELIABILITY .9637

IERR 2

POWER REQUIREMENT

63.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312

EQUIPMENT QUANTITIES 1 1 2 2 3 1 1 2

WEIGHT 42.84 LBS VOLUME 1.75(FT**3)

RELIABILITY .9897

IERR*****

POWER REQUIREMENT

35.4 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 515 269 650 702

EQUIPMENT QUANTITIES 2 10 2 2 1

WEIGHT 226.98 LBS VOLUME 2.74(FT**3)

HARNESS WEIGHT 103.3(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9167

POWER DISSIPATION

122.7 WATT

57.2(LBS)

MISSION EQUIPMENT

WEIGHT 1000.00 LBS VOLUME 39.53(FT**3)

RELIABILITY .9000

POWER REQUIREMENT

425.0 WATT

VI-32

HEAT CAP MAP MISSION F/O (HCKM) NO1-1-7

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	20.6 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER.	1944.1 (BTU/HR),	TOTAL RADIATOR AREA	21.5 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.5 (FT)	TOTAL HEATER POWER	2034.1 (BTU/HR)
STORED ENERGY	115.2 (BTU)	VARIABLE CONDUCTANCE H.P.	734.8 (WATT-IN)
		AVERAGE HEAT LOAD	2056.3 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	14.8
HEAT PIPES	4.8
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	13.0
TOTAL	35.5

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.021 (IN)			
STRINGER NO. THICKNESS, HT.	166.	81910.347 (IN),	.436 (IN)	
FRAME NO. THICKNESS, HT.	5.	.125 (IN),	.626 (IN)	
GRID BEAM THICKNESS	.187 (IN),	SPACING 5.267 (IN),	HEIGHT 2.634 (IN)	
ENCLOSURE THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	154.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	24.7 (LBS)			
ADAPTER WEIGHT	81.6 (LBS)			

HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-54

HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	10	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	96.0
DATA PROCESSING	60.5
COMMUNICATIONS	42.8
BATTERIES	142.6
POWER CONTROL	64.4
SOLAR ARRAY	57.2
HARNESS	103.3
STRUCTURE	202.0
SOLAR ARRAY DRIVE	9.5
THERMAL CONTROL	35.5
DRY WEIGHT	1898.8
PROPELLANT	271.2
SATELLITE ADAPTER	81.6

TOTAL LAUNCH WEIGHT 2251.6

VI-35

STEREOSAT NG1-1-8

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 2794. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.1 (IPS)

CDPI TABLE
NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUPERFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
32.	128.
125.	100.
8.	8.
2.	2.
1.0000	1.0000
64.	64.

COMMUNICATIONS
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER
CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 343.54 WATTS
TOTAL SOLAR ARRAY AREA 142.06 SQ FT
INSTALLED BATTERY CAPACITY 14.00 AMP-HR
BEGINNING OF LIFE POWER 840.29 WATTS

VEHICLE SIZING
CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 897.6 LBS (407.2 KG) LAUNCH WEIGHT = 948.1 LBS (430.1 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 108.5 IN. (2.76 M) 120.0 IN. (3.05 M) 120.0 IN. (3.05 M)
MISSION EQUIPMENT 15.1 IN. (.38 M) 25.2 IN. (.64 M) 25.2 IN. (.64 M)
TOTAL SATELLITE 123.6 IN. (3.14 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 247.9 IYY = 1578116.1 IZZ = 1578116.1
X-CG Y-CG Z-CG
CENTER OF GRAVITY 60.0 IN. (1.52 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 312.1/ 312.1 96.5
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 31.0 (MO)
RELIABILITY .709

Y1-3

STEREOSAT NO1-1-6

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1305					
EQUIPMENT QUANTITIES	2	2	1	1					
WEIGHT	37.80 LBS								
VOLUME			1.19(FT**3)						
RELIABILITY		.9550							
IERR	10								

POWER REQUIREMENT 103.6 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	906	1003	499	203	1109	503	701	1203	603
EQUIPMENT QUANTITIES	12	4	5	9	1	1	1	1	2	1	1
WEIGHT	51.11 LBS										
VOLUME					2.93(FT**3)						
DRY WEIGHT	35.23(LBS)										
EXPENDABLE WEIGHT								15.68(LBS)			
RELIABILITY		.9479									
IERR	10										

.3 WATT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	403						
EQUIPMENT QUANTITIES	1	1	1						
WEIGHT	30.11 LBS								
VOLUME			.54(FT**3)						
RELIABILITY		.9700							
IERR	2								

POWER REQUIREMENT 13.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312	
EQUIPMENT QUANTITIES	2	1	2	1	2	1	2	2	
WEIGHT	23.62 LBS								
VOLUME					.28(FT**3)				
RELIABILITY		.9793							
IERR	*****								

POWER REQUIREMENT 35.4 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	106	212	303	1202					
EQUIPMENT QUANTITIES	12	2	2	1					
WEIGHT	101.47 LBS								
VOLUME					2.13(FT**3)				
HARNESS WEIGHT		43.2(LBS)							
SOLAR ARRAY WEIGHT								69.8(LBS)	
RELIABILITY		.9146							

POWER DISSIPATION 37.50 WATT

MISSION EQUIPMENT

WEIGHT	110.00 LBS								
VOLUME					4.36(FT**3)				
RELIABILITY		.9000							

POWER REQUIREMENT 100.0 WATT

V1-37

STEREOSAT NC1-1-8

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	11.4 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER,	1082.0 (BTU/HR),	TOTAL RADIATOR AREA	12.5 (FT**2)
HEAT PIPE	23434.7 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	7.7 (FT)	TOTAL HEATER POWER	1197.0 (BTU/HR)
STORED ENERGY	109.0 (BTU)	VARIABLE CONDUCTANCE H.P.	1599.6 (WATT-IN)
		AVERAGE HEAT LOAD	861.8 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	UNIT WEIGHT (LBS)
HEAT PIPES	36.4
PHASE CHANGE MATERIAL	8.1
RADIATOR (PASSIVE)	2.7
	7.2
TOTAL	54.4

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.012 (IN)		
STRINGER NO., THICKNESS, HT.	287.	3597.266 (IN),	.440 (IN)
FRAME NO., THICKNESS, HT.	7.	.126 (IN),	.632 (IN)
GRID BEAM THICKNESS	.096 (IN),	SPACING 2.706 (IN),	HEIGHT 1.353 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	72.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	15.12 (LBS)		
ADAPTER WEIGHT	50.5 (LBS)		

V1-38

STEREOSAT NO1-1-8

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTPNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1305	REACTION WHEEL	1	5.0	.1	25.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1109	TANK	1	3.5	.4	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	PASFBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-39

STEREOSAT NO1-1-8

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
106	SHUNT REGULATOR	12	4.3	.1	0.0
212	BATTERY	2	15.7	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	110.0
STABILITY AND CONTROL	37.8
AUXILIARY PROPULSION	35.2
DATA PROCESSING	30.1
COMMUNICATIONS	23.6
BATTERIES	31.4
POWER CONTROL	70.1
SOLAR ARRAY	69.8
HARNESS	43.2
STRUCTURE	376.1
THERMAL CONTROL	14.4
DRY WEIGHT	881.8
PROPELLANT	15.9
SATELLITE ADAPTER	50.5

TOTAL LAUNCH WEIGHT	948.1

VI-40

366

SEASAT-B NO2-1-1

I * * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .250000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 14626 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
3.
1.0000
32.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 129.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 1263.94 WATTS
TOTAL SOLAR ARRAY AREA 279.92 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 3447.97 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 2568.6 LBS (1165.1 KG) LAUNCH WEIGHT = 2661.2 LBS (1207.1 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	35.6 IN. (.90 M)	59.4 IN. (1.51 M)	59.4 IN. (1.51 M)	
MISSION EQUIPMENT	35.0 IN. (.89 M)	58.3 IN. (1.48 M)	58.3 IN. (1.48 M)	
TOTAL SATELLITE	70.6 IN. (1.79 M)			

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 1419.8 IYY = 1425947.3 IZZ = 7047975.5
X-CG Y-CG Z-CG
CENTER OF GRAVITY 40.2 IN. (1.02 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 380.0 / 380.0 / 87.0
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 31.6 (MO)
RELIABILITY .1725

17-11

SEASAT-B NO2-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 1

WEIGHT 37.96 LBS VOLUME 1.18 (FT**3)

RELIABILITY .9550

ILRR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121

EQUIPMENT QUANTITIES 12 4 5 9 1 1 1

WEIGHT 137.24 LBS VOLUME 4.25 (FT**3)

DRY WEIGHT 54.13 (LBS), EXPENDABLE WEIGHT

RELIABILITY .9299

ILRR 10

506 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
83.10 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 3 1

WEIGHT 8 (.51 LBS) VOLUME 1.67 (FT**3)

RELIABILITY .9637

ILRR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227

EQUIPMENT QUANTITIES 2 1 2 1 2 1 2

WEIGHT 23.62 LBS VOLUME .28 (FT**3)

RELIABILITY .9793

ILRR*****

312
2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 424 532 269 650 702

EQUIPMENT QUANTITIES 2 10 2 2 1

WEIGHT 300.32 LBS VOLUME 4.29 (FT**3)

HARNESS WEIGHT 115.0 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9616

POWER DISSIPATION 1687.9 WATTS
194.9 (LBS)

MISSION EQUIPMENT

WEIGHT 1367.00 LBS VOLUME 54.02 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT 670.0 WATTS

V1-42

SEASAT-B NO2-1-1

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRONICS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	PASFBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	PLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

V1-43

SEASAT-B NO2-1-1

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
424	DISCHGE REGULATOR	2	32.0	.8	0.0
532	SHUNT REGULATOR	10	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	PATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

EIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1367.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	54.1
DATA PROCESSING	80.5
COMMUNICATIONS	23.6
BATTERIES	142.6
POWER CONTROL	157.8
SOLAR ARRAY	194.9
HAPNESS	115.0
STRUCTURE	165.1
SOLAR ARRAY DRIVE	32.4
THERMAL CONTROL	114.7
DRY WEIGHT	2485.4
PROPELLANT	63.1
SATELLITE ADAPTER	92.7

TOTAL LAUNCH WEIGHT 2661.2

71-44

ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 24306. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = C. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	32.	128.
MAIN FRAME SAMPLE RATE	125.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	2.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER
CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 603.54 WATTS
TOTAL SOLAR ARRAY AREA 144.38 SQ FT
INSTALLED BATTERY CAPACITY 40.00 AMP-HR
BEGINNING OF LIFE POWER 1778.38 WATTS

VEHICLE SIZING
CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 1580.4 LBS (716.9 KG) LAUNCH WEIGHT = 1641.2 LBS (744.4 K)
DIMENSIONS
EQUIPMENT BAY 39.9 IN. (1.01 M) 66.5 IN. (1.69 M) 66.5 IN. (1.69 M)
MISSION EQUIPMENT 27.0 IN. (.68 M) 44.9 IN. (1.14 M) 44.9 IN. (1.14 M)
TOTAL SATELLITE 66.6 IN. (1.70 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 457.2 IYY = 952103.3 IZZ = 2297330.4
X-CG Y-CG Z-CG
CENTER OF GRAVITY 36.5 IN. (.93 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 486.1/ 160./100.0
MISSION LIFETIME 24.0 (MO)
MEAN MISSION DURATION 21.5 (MO)
RELIABILITY .728

✓1-45

ENVIRONMENTAL MONITOR SAT (EMS) ND2-1-2

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1322		
EQUIPMENT QUANTITIES	2	2	1	1		
WEIGHT	63.80 LBS					
VOLUME			1.95(FT**3)			
RELIABILITY		.9707				
POWER REQUIREMENT						88.6 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	629	834	907	1003	499	203	1124	521	701	1203	603
EQUIPMENT QUANTITIES	12	4	5	9	1	1	1	1	2	1	1
WEIGHT	226.25 LBS										
VOLUME					6.37(FT**3)						
DRY WEIGHT	83.84(LBS)										
EXPENDABLE WEIGHT								142.41(LBS)			
RELIABILITY		.9003									
POWER REQUIREMENT											.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403
EQUIPMENT QUANTITIES	1	1	3	1
WEIGHT	80.51 LBS			
VOLUME			1.67(FT**3)	
RELIABILITY		.9770		
POWER REQUIREMENT				63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312
EQUIPMENT QUANTITIES	2	1	2	1	2	1	2	2
WEIGHT	23.62 LBS							
VOLUME					.20(FT**3)			
RELIABILITY		.9875						
POWER REQUIREMENT								57.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	409	531	239	609	702
EQUIPMENT QUANTITIES	2	8	2	2	1
WEIGHT	155.10 LBS				
VOLUME			4.10(FT**3)		
HARNESS WEIGHT		82.8(LBS)			
SOLAR ARRAY WEIGHT					100.5(LBS)
RELIABILITY		.9598			
POWER DISSIPATION					983.1 WATTS

MISSION EQUIPMENT

WEIGHT	625.00 LBS				
VOLUME		24.72(FT**3)			
RELIABILITY		.9000			
POWER REQUIREMENT					30060 WATTS

74-11

ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	21.9 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	2072.2 (BTU/HR),	TOTAL RADIATOR AREA	23.0 (FT**2)
HEAT PIPE	24447.4 (WATT-IN),	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	4.2 (FT)	TOTAL HEATER POWER	2169.1 (BTU/HR)
STORED ENERGY	107.5 (BTU)	VARIABLE CONDUCTANCE H.P.	676.7 (WATT-IN)
		AVERAGE HEAT LOAD	1663.1 (BTU/HR)

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	13.7	
HEAT PIPES	4.4	
PHASE CHANGE MATERIAL	2.7	
RADIATOR (PASSIVE)	13.9	

TOTAL	34.7	

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.018 (IN)		
STRINGER NO., THICKNESS, HT.	177.	3184.682 (IN),	.370 (IN)
FRAME NO., THICKNESS, HT.	5.	.114 (IN),	.568 (IN)
GRID BEAM THICKNESS	.158 (IN),	4.458 (IN),	HEIGHT 2.229 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	112.13 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	31.9 (LBS)		
ADAPTER WEIGHT	60.8 (LBS)		

VI-47

ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRONICS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1322	REACTION WHEEL	1	31.0	.8	10.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
634	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.6	.4	25.0
403	COMM DFCUD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

87-1A

ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	8	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	625.0
STABILITY AND CONTROL	63.8
AUXILIARY PROPULSION	83.8
DATA PROCESSING	80.5
COMMUNICATIONS	23.6
BATTERIES	67.3
POWER CONTROL	91.8
SOLAR ARRAY	100.5
HARNESS	82.8
STRUCTURE	167.5
SOLAR ARRAY DRIVE	16.7
THERMAL CONTROL	34.7
DEY WEIGHT	1438.0
PROPELLANT	142.4
SATELLITE ADAPTER	60.8

TOTAL LAUNCH WEIGHT 1641.2

57-11

HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 21707.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
3.
.1250
64.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 470.95 WATTS
TOTAL SOLAR ARRAY AREA 103.77 SQ FT
INSTALLED BATTERY CAPACITY 34.00 AMP-HR
BEGINNING OF LIFE POWER 1278.14 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 1299.7 LBS (589.5 KG) LAUNCH WEIGHT = 1349.1 LBS (611.1 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 33.2 IN.(.84 M) 55.4 IN.(1.41 M) 55.4 IN.(1.41 M)
MISSION EQUIPMENT 26.6 IN.(.68 M) 44.3 IN.(1.13 M) 44.3 IN.(1.13 M)
TOTAL SATELLITE 59.8 IN.(1.52 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 233.9 IYY = 609278.7 IZZ = 1238645.7
X-CG Y-CG Z-CG
CENTER OF GRAVITY 33.1 IN.(.84 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 300.7 300.7 90.0
MISSION LIFETIME 24.0(MO)
MEAN MISSION DURATION 19.7(MO)
RELIABILITY .605

VI-50

HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1309

EQUIPMENT QUANTITIES 2 1 1 1
WEIGHT 34.120 LBS VOLUME 1.08(FT**3)

RELIABILITY .9335

IERR 0

POWER REQUIREMENT 79.7 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124

EQUIPMENT QUANTITIES 12 4 4 9 1 1 1

WEIGHT 185.39 LBS VOLUME 5.26(FT**3)

DRY WEIGHT 58.20(LBS), EXPENDABLE WEIGHT

RELIABILITY .8971

IERR 0

511 701 1203 603
1 1 1 1
POWER REQUIREMENT .3 WATTS
127.18(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 2 1

WEIGHT 63.71 LBS VOLUME 1.29(FT**3)

RELIABILITY .9136

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227

EQUIPMENT QUANTITIES 1 1 1 1 2 1 1

WEIGHT 17.82 LBS VOLUME .22(FT**3)

RELIABILITY .9408

IERR*****

312
1
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 233 609 702

EQUIPMENT QUANTITIES 2 12 2 2 1

WEIGHT 117.08 LBS VOLUME 1.60(FT**3)

HARNESS WEIGHT 53.2(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9336

POWER DISSIPATION 669.4 WATTS
72.3(LBS)

MISSION EQUIPMENT

WEIGHT 600.100 LBS VOLUME 23.73(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 290.0 WATTS

V-57

HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	21.1 (FT**2),	BATTERY RADIATOR AREA	22.9 (FT**2)
HEATER POWER	2031.8 (BTU/HR),	TOTAL RADIATOR AREA	22.0 (FT**2)
HEAT PIPE	21027.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	2121.8 (BTU/HR)
STORED ENERGY	106.1 (BTU)	VARIABLE CONDUCTANCE H.P.	605.5 (WATT-IN)
		AVERAGE HEAT LOAD	1598.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	11.2
HEAT PIPES	3.9
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	13.4
TOTAL	31.2

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	169.	3566.181 (IN),		.345 (IN)
FRAME NO., THICKNESS, HT.	5.	.099 (IN),		.495 (IN)
GRID BEAM THICKNESS	.145 (IN),	SPACING 4.071 (IN),	HEIGHT 2.036 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	85.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	27.2 (LBS)			
ADAPTER WEIGHT	49.4 (LBS)			

VI-52

HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

* * * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	1	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1309	REACTION WHEEL	1	8.5	.1	1.1

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	4	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
511	TANK	1	11.5	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	2	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

11-53

HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	12	2.3	.0	0.0
233	BATTERY	2	26.7	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	34.2
AUXILIARY PROPULSION	58.2
DATA PROCESSING	63.7
COMMUNICATIONS	17.8
BATTERIES	53.5
POWER CONTROL	63.6
SOLAR ARRAY	72.3
HARNESS	53.2
STRUCTURE	112.8
SOLAR ARRAY DRIVE	12.0
THERMAL CONTROL	31.2
DRY WEIGHT	1172.5
PROPELLANT	127.2
SATELLITE ADAPTER	49.4

TOTAL LAUNCH WEIGHT. 1349.1

75-11

STORMSAT NO2-1-4

***** SYSTEM DESCRIPTION -- DESIGN NUMBER 1*****

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 33630.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
3.
1.0000
32.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 995.28 WATTS
TOTAL SOLAR ARRAY AREA 112.53 SQ FT
INSTALLED BATTERY CAPACITY 132.00 AMP-HR
BEGINNING OF LIFE POWER 1432.76 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1837.5 LBS (833.5 KG)

DIMENSIONS
EQUIPMENT BAY 38.7 IN.(.98 M)
MISSION EQUIPMENT 27.7 IN.(.70 M)
TOTAL SATELLITE 66.5 IN.(1.69 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

LAUNCH WEIGHT = 1904.4 LBS (863.8 K

HEIGHT 64.5 IN.(1.64 M) WIDTH 64.5 IN.(1.64 M)
46.2 IN.(1.17 M) 46.2 IN.(1.17 M)

IYY = 1082198.1 IZZ = 1888442.2

Y-CG 0.0 IN.(0.00 M) Z-CG 0.0 IN.(0.00 M)

CENTER OF GRAVITY 34.6 IN.(.88 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323.// 0.(
MISSION LIFETIME 36.0(MO)
MEAN MISSION DURATION 31.1(MO)
RELIABILITY .701

VI-51

STORMSAT NO2-1-4

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24(FT**3)

RELIABILITY .9675

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603

EQUIPMENT QUANTITIES 18 6 5 9 2 1 1 1 2 1 1

WEIGHT 265.36 LBS VOLUME 6.92(FT**3)

DRY WEIGHT 74.27(LBS), EXPENDABLE WEIGHT

RELIABILITY .9563

IERR 11

POWER REQUIREMENT .3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 3 1

WEIGHT 80.51 LBS VOLUME 1.67(FT**3)

RELIABILITY .9637

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312

EQUIPMENT QUANTITIES 1 1 2 1 3 1 1 2

WEIGHT 38.92 LBS VOLUME 1.70(FT**3)

RELIABILITY .9820

IERR*****

POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 530 260 650 702

EQUIPMENT QUANTITIES 4 11 4 4 1

WEIGHT 301.09 LBS VOLUME 3.46(FT**3)

HARNESS WEIGHT 85.1(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8899

POWER DISSIPATION 168.0 WATTS

78.4(LBS)

MISSION EQUIPMENT

WEIGHT 680.00 LBS VOLUME 26.89(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 700.0 WATTS

VI-57C

STORMSAT NO2-1-4 .

* * * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	30.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2861.2(BTU/HR),	TOTAL RADIATOR AREA	30.9 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	90.0(BTU/HR)
HEAT PIPE LENGTH	4.2 (FT)	TOTAL HEATER POWER	2951.2(BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	672.8(WATT-IN)
		AVERAGE HEAT LOAD	2994.0 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	UNIT WEIGHT (LBS)
HEAT PIPES	13.4
PHASE CHANGE MATERIAL	4.4
RADIATOR (ACTIVE)	3.1
	62.8
TOTAL	83.6

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.019 (IN)			
STRINGER NO., THICKNESS, HT.	169.		81910.347 (IN),	.405 (IN)
FRAME NO., THICKNESS, HT.	5.		.116 (IN),	.581 (IN)
GRID BEAM THICKNESS	.171 (IN),	SPACING	4.804 (IN),	HEIGHT 2.402 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	147.6 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	28.2 (LBS)			
ADAPTER WEIGHT	66.9 (LBS)			

VI-57

C-2

STORMSAT NO2-1-4

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-58

STORMSAT NO2-1-4

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
530	SHUNT REGULATOR	11	2.2	.0	0.0
260	BATTERY	4	47.5	.2	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	680.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	74.3
DATA PROCESSING	80.5
COMMUNICATIONS	38.9
BATTERIES	190.1
POWER CONTROL	111.0
SOLAR ARRAY	78.4
HARNESS	85.1
STRUCTURE	168.5
SOLAR ARRAY DRIVE	13.0
THERMAL CONTROL	83.6
DRY WEIGHT	1646.4
PROPELLANT	191.1
SATELLITE ADAPTER	66.9

TOTAL LAUNCH WEIGHT 1904.4

VI-59

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 2551. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
4.
.1250
64.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 199.89 WATTS
TOTAL SOLAR ARRAY AREA 78.90 SQ FT
INSTALLED BATTERY CAPACITY 9.00 AMP-HR
BEGINNING OF LIFE POWER 466.69 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT =	623.1 LBS (	282.6 KG)	LAUNCH WEIGHT =	656.9 LBS (	298.0 KI
DIMENSIONS	LENGTH		HEIGHT	WIDTH	
EQUIPMENT BAY	65.9 IN. (	1.67 M)	109.8 IN. (	2.79 M)	109.8 IN. (
MISSION EQUIPMENT	12.0 IN. (	.30 M)	20.0 IN. (	.51 M)	20.0 IN. (
TOTAL SATELLITE	77.9 IN. (	1.98 M)			
MOMENTS OF INERTIA (SLUGS*FT**2)	IXX =	148.0	IYY =	700052.5	IZZ =
	X-CG		Y-CG		Z-CG
CENTER OF GRAVITY	23.2 IN. (	.59 M)	0.0 IN. (	0.00 M)	0.0 IN. (

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 324./ 324./ 50.
MISSION LIFETIME 24.0 (MO)
MEAN MISSION DURATION 20.6 (MO)
RELIABILITY .701

VI-60

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ****

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 1 1 1

WEIGHT 30.80 LBS VOLUME 1.04(FT**3)

RELIABILITY .9335

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1109

EQUIPMENT QUANTITIES 12 2 5 9 1 1 1

WEIGHT 48.13 LBS VOLUME 2.86(FT**3)

DRY WEIGHT 33.63(LBS), EXPENDABLE WEIGHT

RELIABILITY .9476

IERR 10

503 701 1203 603
1 1 1 1
POWER REQUIREMENT
14.49(LBS)

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 1 1 1

WEIGHT 30.11 LBS VOLUME .54(FT**3)

RELIABILITY .9799

IERR 2

POWER REQUIREMENT 13.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227

EQUIPMENT QUANTITIES 1 1 1 1 2 1 1

WEIGHT 17.82 LBS VOLUME .22(FT**3)

RELIABILITY .9408

IERR*****

312
1
POWER REQUIREMENT

35.4 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 205 303 1202

EQUIPMENT QUANTITIES 8 3 2 1

WEIGHT 80.94 LBS VOLUME 1.64(FT**3)

HARNESS WEIGHT 29.0(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9555

POWER DISSIPATION 216.9 WATTS
38.8(LBS)

MISSION EQUIPMENT

WEIGHT 55.00 LBS VOLUME 2.18(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 70.0 WATTS

VI-61

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	8.9 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	841.6(BTU/HR),	TOTAL RADIATOR AREA	10.0 (FT**2)
HEAT PIPE	11565.6(WATT-IN),	BATTERY HEATER POWER	116.7(BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	958.3(BTU/HR)
STORED ENERGY	106.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1007.5(WATT-IN)
		AVERAGE HEAT LOAD	675.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	22.7
HEAT PIPES	5.1
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	5.6
TOTAL	36.1

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.009 (IN)			
STPINGER NO., THICKNESS, HT.	316.		3628.189 (IN),	.366 (IN)
FRAME NO., THICKNESS, HT.	5.		.105 (IN),	.525 (IN)
GRID BEAM THICKNESS	.082 (IN),	SPACING	2.307 (IN),	HEIGHT 1.154 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	57.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	15.2 (LBS)			
ADAPTER WEIGHT	33.8 (LBS)			

V1-62

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	1	7.1	.1	62.0
1915	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1109	TANK	1	3.5	.4	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

VI-63

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
205	BATTERY	32	14.4	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	55.0
STABILITY AND CONTROL	30.8
AUXILIARY PROPULSION	33.6
DATA PROCESSING	30.1
COMMUNICATIONS	17.8
BATTERIES	28.8
POWER CONTROL	52.1
SOLAR ARRAY	38.8
HARNESS	29.0
STRUCTURE	256.4
THERMAL CONTROL	36.1
DRY WEIGHT	608.6
PROPELLANT	14.5
SATELLITE ADAPTER	33.8

TOTAL LAUNCH WEIGHT 656.9

VI-64

SPACE TELESCOPE NP1-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1321

EQUIPMENT QUANTITIES 2 2 1 1

WEIGHT 50.00 LBS VOLUME 11.94(FT**3)

RELIABILITY .9550

IERR 0

POWER REQUIREMENT

78.6 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124

EQUIPMENT QUANTITIES 12 6 5 9 2 1 3

WEIGHT 401.23 LBS VOLUME 11.68(FT**3)

DRY WEIGHT 115.04(LBS), EXPENDABLE WEIGHT

RELIABILITY .9462

IERR 1

527 701 1203 603

1 2 1 1

POWER REQUIREMENT

.3 WATTS

286.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 1 1 1

WEIGHT 30.11 LBS VOLUME .54(FT**3)

RELIABILITY .9700

IERR 2

POWER REQUIREMENT

13.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603 203

EQUIPMENT QUANTITIES 1 1 2 2 3 1 1

WEIGHT 46.84 LBS VOLUME .58(FT**3)

RELIABILITY .9766

IERR*****

312

2

POWER REQUIREMENT

35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 530 236 609 702

EQUIPMENT QUANTITIES 2 12 2 3 1

WEIGHT 128.74 LBS VOLUME 2.14(FT**3)

HARNESS WEIGHT 892.3(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9104

POWER DISSIPATION

767.0 WATTS

85.4(LBS)

MISSION EQUIPMENT

WEIGHT 12000.00 LBS VOLUME 480.00(FT**3)

RELIABILITY .9000

POWER REQUIREMENT

300.0 WATTS

VI-65

SPACE TELESCOPE NP1-1-1

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	26.5 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2563.5 (BTU/HR),	TOTAL RADIATOR AREA	27.4 (FT**2)
HEAT PIPE	38626.6 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	7.5 (FT)	TOTAL HEATER POWER	2653.4 (BTU/HR)
STORED ENERGY	93.3 (BTU)	VARIABLE CONDUCTANCE H.P.	1219.2 (WATT-IN)
		AVERAGE HEAT LOAD	1458.5 (BTU/HR)

THERMAL CONTROL WEIGHT	
	UNIT WEIGHT (LBS)
INSULATION	24.6
HEAT PIPES	7.9
PHASE CHANGE MATERIAL	2.3
RADIATOR (PASSIVE).	16.8

TOTAL

IERR 1100010011

STRUCTURES			
SKIN THICKNESS	.054 (IN)		
STRINGER NO., THICKNESS, HT.	111. ,	3487.671 (IN),	.748 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.215 (IN),	1.073 (IN)
GRID BEAM THICKNESS	.479 (IN),	SPACING 13.495 (IN),	HEIGHT 6.747 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	133.2 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	29.4 (LBS)		
ADAPTER WEIGHT	359.7 (LBS)		

VI-66

SPACE TELESCOPE NP1-1-1

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1321	REACTION WHEEL	1	17.2	10.8	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	3	11.5	2.4	0.0
527	TANK	1	30.0	1.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECGD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-67

SPACE TELESCOPE NP1-1-1

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
236	BATTERY	2	31.5	.3	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	12000.0
STABILITY AND CONTROL	50.0
AUXILIARY PROPULSION	115.0
DATA PROCESSING	30.1
COMMUNICATIONS	46.8
BATTERIES	63.0
POWER CONTROL	65.8
SOLAR ARRAY	85.4
HARNESS	892.3
STRUCTURE	600.4
SOLAR ARRAY DRIVE	14.2
THERMAL CONTROL	51.6
DRY WEIGHT	14014.6
PROPELLANT	286.2
SATELLITE ADAPTER	359.7

TOTAL LAUNCH WEIGHT 14660.5

VI-68

HEAD-D NP1-1-2

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 49505. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
32.	128.
125.	100.
8.	8.
2.	2.
1.0000	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 968.54 WATTS

TOTAL SOLAR ARRAY AREA 218.99 SQ FT

INSTALLED BATTERY CAPACITY 66.00 AMP-HR

BEGINNING OF LIFE PCWER 2697.46 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 11568.3 LBS (5247.3 KG)

LAUNCH WEIGHT = 11889.0 LBS (5392.8 KG)

DIMENSIONS LENGTH

HEIGHT

WIDTH

EQUIPMENT BAY 42.3 IN. (1.07 M)

70.5 IN. (1.79 M)

70.5 IN. (1.79 M)

MISSION EQUIPMENT 66.2 IN. (1.68 M)

110.4 IN. (2.80 M)

110.4 IN. (2.80 M)

TOTAL SATELLITE 108.5 IN. (2.76 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

2134.4 IYY = 9808947.5

IZZ = 13199381.3

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 66.9 IN. (1.70 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION

250.1 250.0 28.5

MISSION LIFETIME

24.0 (MO)

MEAN MISSION DURATION

21.2 (MO)

RELIABILITY

.708

VI-69

HEAD-D NP1-1-2

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1322			
EQUIPMENT QUANTITIES	2	2	1	1			
WEIGHT	63.80 LBS		VOLUME	1.95 (FT**3)	POWER REQUIREMENT	88.6 WATTS	
RELIABILITY		.9707					
IERR	0						

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	907	1003	499	203	1124	530	701	1203	603
EQUIPMENT QUANTITIES	12	4	5	9	2	1	3	1	2	1	1
WEIGHT	427.70 LBS		VOLUME	12.09 (FT**3)	POWER REQUIREMENT	.3 WATTS					
DRY WEIGHT	137.64 (LBS)		EXPENDABLE WEIGHT	290.06 (LBS)							
RELIABILITY		.9048									
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403		
EQUIPMENT QUANTITIES	1	1	3	1		
WEIGHT	80.51 LBS		VOLUME	1.67 (FT**3)	POWER REQUIREMENT	63.5 WATTS
RELIABILITY		.9770				
IERR	2					

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	203	103	306	401	503	603	203	312
EQUIPMENT QUANTITIES	1	1	2	1	2	1	1	2
WEIGHT	41.42 LBS		VOLUME	.51 (FT**3)	POWER REQUIREMENT	35.4 WATTS		
RELIABILITY		.9775						
IERR	*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	418	531	260	650	702	
EQUIPMENT QUANTITIES	2	11	2	2	1	
WEIGHT	219.43 LBS		VOLUME	3.34 (FT**3)	POWER DISSIPATION	1438.1 WATTS
HARNESS WEIGHT	687.8 (LBS)		SOLAR ARRAY WEIGHT	152.5 (LBS)		
RELIABILITY		.9384				

MISSION EQUIPMENT

WEIGHT	9300.00 LBS	VOLUME	366.78 (FT**3)	POWER REQUIREMENT	665.0 WATTS
RELIABILITY		.9000			

VI-70

HEAD-D NP1-1-2

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	52.9 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	5058.2(BTU/HR),	TOTAL RADIATOR AREA	53.8 (FT**2)
HEAT PIPE	69418.8(WATT-IN),	BATTERY HEATER POWER	90.0(BTU/HR)
HEAT PIPE LENGTH	6.8 (FT)	TOTAL HEATER POWER	5148.2(BTU/HR)
STORED ENERGY	116.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1099.0(WATT-IN)
		AVERAGE HEAT LOAD	2907.7 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	UNIT WEIGHT (LBS)
HEAT PIPES	20.7
PHASE CHANGE MATERIAL	7.1
RADIATOR (ACTIVE)	2.9
	95.6

TOTAL	126.3

IERR 1100010011

STRUCTURES			
SKIN THICKNESS	.049 (IN)		
STRINGER NO., THICKNESS, HT.	111. ,	3434.591 (IN),	.673 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.193 (IN),	.966 (IN)
GRID BEAM THICKNESS	.431 (IN),	SPACING 12.149 (IN),	HEIGHT 6.074 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	168.5 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	40.5 (LBS)		
ADAPTER WEIGHT	320.7 (LBS)		

V1-71

HEAD-D NP1-1-2

***** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 *****

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1322	REACTION WHEEL	1	31.0	.8	10.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
934	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	3	11.5	2.4	0.0
530	TANK	1	50.0	2.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-72

HEAD-D NP1-1-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER		UNIT	UNIT	UNIT
IDENT	TYPE	NO.	WEIGHT	VOLUME
418	DISCHGE REGULATOR	2	24.0	.6
531	SHUNT REGULATOR	11	4.3	.1
260	BATTERY	2	47.5	.2
650	BATTERY CHARGER	2	9.7	.2
702	POWER CONTROL	1	7.4	.6

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	9300.0
STABILITY AND CONTROL	63.8
AUXILIARY PROPULSION	137.6
DATA PROCESSING	80.5
COMMUNICATIONS	41.4
BATTERIES	95.0
POWER CONTROL	124.4
SOLAR ARRAY	152.5
HARNESS	687.8
STRUCTURE	443.6
SOLAR ARRAY DRIVE	25.3
THERMAL CONTROL	126.3
DRY WEIGHT	11278.3
PROPELLANT	290.1
SATELLITE ADAPTER	320.7

TOTAL LAUNCH WEIGHT 11889.0

VI-73

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

POINTING ACCURACY = .600000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 11309.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 179.05 WATTS

TOTAL SOLAR ARRAY AREA 65.41 SQ FT

INSTALLED BATTERY CAPACITY 30.00 AMP-HR

BEGINNING OF LIFE POWER 211.57 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1399.4 LBS (634.8 KG)

LAUNCH WEIGHT = 1454.9 LBS (659.9 KG)

DIMENSIONS

EQUIPMENT BAY 42.4 IN.(1.08 M)

70.7 IN.(1.80 M)

70.7 IN.(1.80 M)

MISSION EQUIPMENT 28.6 IN.(.73 M)

47.7 IN.(1.21 M)

47.7 IN.(1.21 M)

TOTAL SATELLITE 71.1 IN.(1.80 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

185.7 IYY = 960742.2

IZZ = 960742.2

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 43.0 IN.(1.09 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 100000./*****/ 28.5

MISSION LIFETIME 24.0(MO)

MEAN MISSION DURATION 20.4(MO)

RELIABILITY .559

VI-74

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	803	1413
EQUIPMENT QUANTITIES	1	1	1	1	2	1
WEIGHT	30.56 LBS	VOLUME		1.21(FT**3)		
RELIABILITY		.9617				
IERR	0					

POWER REQUIREMENT 9.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1116	509	701	1203	603
EQUIPMENT QUANTITIES	6	2	4	9	1	1	1	1	1	1	1
WEIGHT	132.89 LBS	VOLUME		4.16(FT**3)		POWER REQUIREMENT					
DRY WEIGHT	64.91(LBS)	EXPENDABLE WEIGHT		67.98(LBS)		1.0 WATTS					
RELIABILITY		.7435									
IERR	11										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403	
EQUIPMENT QUANTITIES	1	1	
WEIGHT	21.18 LBS	VOLUME	.39(FT**3)
RELIABILITY		.9866	
IERR	1		

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

EQUIPMENT CODE IDENTIFIER	206	398	401	503	227
EQUIPMENT QUANTITIES	1	1	1	2	1
WEIGHT	21.27 LBS	VOLUME		1.44(FT**3)	
RELIABILITY		.9342			
IERR*****					

POWER REQUIREMENT 77.2 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	102	227	309	1202
EQUIPMENT QUANTITIES	12	2	2	1
WEIGHT	15.92 LBS	VOLUME		3.04(FT**3)
HARNESS WEIGHT		65.8(LBS), SOLAR ARRAY WEIGHT		32.1(LBS)
RELIABILITY		.9424		

POWER DISSIPATION 3.5 WATTS

MISSION EQUIPMENT

WEIGHT	750.00 LBS	VOLUME	29.65(FT**3)
RELIABILITY		.9000	

POWER REQUIREMENT 80.0 WATTS

VI-75

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	5.6 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	378.1 (BTU/HR),	TOTAL RADIATOR AREA	6.5 (FT**2)
HEAT PIPE	9494.8 (WATT-IN),	BATTERY HEATER POWER	85.1 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	463.2 (BTU/HR)
STORED ENERGY	68.3 (BTU)	VARIABLE CONDUCTANCE H.P.	919.3 (WATT-IN)
		AVERAGE HEAT LOAD	607.6 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		15.0
HEAT PIPES		4.7
PHASE CHANGE MATERIAL		2.2
RADIATOR (PASSIVE)		3.5
	TOTAL	25.4

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.017 (IN)		
STRINGER NO., THICKNESS, FT.	189.		
FRAME NO., THICKNESS, FT.	5.	825452.780 (IN),	.394 (IN)
GRID BEAM THICKNESS	.148 (IN),	.113 (IN),	.566 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	SPACING 4.161 (IN),	HEIGHT 2.081 (IN)
EQUIPMENT BAY STRUCTURE WT.	100.2 (LBS)	CENTER 0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	55.4 (LBS)		

VI-76

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUITATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	2	1.3	.0	0.0
1413	POWER CONVEKTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	3.9	.2	3.0
403	CGMPD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
398	XTR	1	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

VI-77

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	12	5.0	.1	0.0
227	BATTERY	2	30.4	.4	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	750.0
STABILITY AND CONTROL	14.7
AUXILIARY PROPULSION	64.9
DATA PROCESSING	21.2
COMMUNICATIONS	21.3
BATTERIES	60.7
POWER CONTROL	97.2 ✓
CONVERTERS	15.9 ✓
SOLAR ARRAY	32.1 ✓
HARNESS	65.8 ✓
STRUCTURE	162.3
THERMAL CONTROL	25.4
DRY WEIGHT	1331.4
PROPELLANT	68.0
SATELLITE ADAPTER	55.4

TOTAL LAUNCH WEIGHT 1454.9

V1-78

VERY LONG BASELINE INTERFEROMETER-B NP1-1-4B

* * * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 1211C.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 300.05 WATTS
TOTAL SOLAR ARRAY AREA 116.05 SQ FT
INSTALLED BATTERY CAPACITY 24.00 AMP-HR
BEGINNING OF LIFE POWER 375.40 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1508.6 LBS (684.3 KG)

DIMENSIONS

EQUIPMENT BAY 56.5 IN.(1.43 M)
MISSION EQUIPMENT 28.6 IN.(.73 M)
TOTAL SATELLITE 85.1 IN.(2.16 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

LAUNCH WEIGHT = 1574.2 LBS (714.0 KG)

HEIGHT

94.2 IN.(2.39 M) 94.2 IN.(2.39 M)
47.7 IN.(1.21 M) 47.7 IN.(1.21 M)

IYY = 1536079.9 IZZ = 1536079.9

CENTER OF GRAVITY 55.4 IN.(1.41 M)

Y-CG 0.0 IN.(0.00 M) Z-CG 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 24.0(MO)

MEAN MISSION DURATION 21.1(MO)

RELIABILITY .704

VI-79

VERY LONG BASELINE INTERFEROMETER-B NP1-1-4B

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 141
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 32.05 LBS VOLUME 1.29(FT**3)
RELIABILITY .9285
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116
EQUIPMENT QUANTITIES 6 2 5 9 1 1 1
WEIGHT 138.41 LBS VOLUME 4.23(FT**3)
DRY WEIGHT 65.61(LBS), EXPENDABLE WEIGHT
RELIABILITY .9086
IERR 11

509 701 1203 603
1 1 1 1
POWER REQUIREMENT 1.0 WATTS
72.80(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9866
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

EQUIPMENT CODE IDENTIFIER 206 342 401 503 22
EQUIPMENT QUANTITIES 1 1 1 2 1
WEIGHT 12.17 LBS VOLUME .26(FT**3)
RELIABILITY .9678
IERR*****

POWER REQUIREMENT 77.2 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 221 306 1202
EQUIPMENT QUANTITIES 6 2 2 1
WEIGHT 113.00 LBS VOLUME 1.91(FT**3)
HARNESS WEIGHT 65.0(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9707

POWER DISSIPATION 23.9 WATTS
57.0(LBS)

MISSION EQUIPMENT

WEIGHT 750.00 LBS VOLUME 29.65(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 200.0 WATTS

08-1A

VERY LONG BASELINE INTERFEROMETER-B NP1-1-4B

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	9.3 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	909.5 (BTU/HR),	TOTAL RADIATOR AREA	10.2 (FT**2)
HEAT PIPE	19103.0 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE LENGTH	5.3 (FT)	TOTAL HEATER POWER	973.0 (BTU/HR)
STORED ENERGY	88.4 (ATU)	VARIABLE CONDUCTANCE H.P.	1101.5 (WATT-IN)
		AVERAGE HEAT LOAD	1020.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	21.5
FEAT PIPES	5.6
PHASE CHANGE MATERIAL	2.2
RADIATOR (PASSIVE)	5.9
TOTAL	35.2

IERR 1100C10111

STRUCTURES			
SKIN THICKNESS	.017 (IN)		
STRINGER NO., THICKNESS, HT.	220. ,	81910.347 (IN),	.452 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.130 (IN),	.649 (IN)
GRID BEAM THICKNESS	.146 (IN),	SPACING 4.104 (IN),	HEIGHT 2.052 (IN)
ENDCLVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	87.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	65.6 (LBS)		

18-1A

VERY LONG BASELINE INTERFEROMETER-B NP1-1-

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
342	TRANSMITTER	1	3.0	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

VI-82

VERY LONG BASELINE INTERFEROMETER-B NP1-1-48

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	750.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	65.6
DATA PROCESSING	21.2
COMMUNICATIONS	12.2
BATTERIES	50.6
POWER CONTROL	62.4
CONVERTERS	15.7
SOLAR ARRAY	57.0
HARNES	65.0
STRUCTURE	284.5
THERMAL CONTROL	35.2
DRY WEIGHT	1435.8
PROPELLANT	72.8
SATELLITE ADAPTER	65.6

TOTAL LAUNCH WEIGHT 1574.2

VI-83

GRAVITY WAVE DETECTOR NP1-1-5

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONO PROPELLANT
TOTAL IMPULSE = 4812. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
4.
.1250
64.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 238.89 WATTS
TOTAL SOLAR ARRAY AREA 46.55 SQ FT
INSTALLED BATTERY CAPACITY 18.00 AMP-HR
BEGINNING OF LIFE POWER 573.40 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 612.2 LBS (277.7 KG)

LAUNCH WEIGHT =

635.8 LBS (288.4 KG)

DIMENSIONS

EQUIPMENT BAY 28.5 IN. (.72 M)
MISSION EQUIPMENT 19.9 IN. (.50 M)
TOTAL SATELLITE 48.4 IN. (1.23 M)

HEIGHT 47.5 IN. (1.21 M)
33.1 IN. (.84 M)

WIDTH 47.5 IN. (1.21 M)
33.1 IN. (.84 M)

MOMENTS OF INERTIA (SLUGS*FT*2) IXX =

7.8 IYY = 201679.8

IZZ = 342825.7

CENTER OF GRAVITY 26.9 IN. (.68 M)

Y-CG 0.0 IN. (0.00 M)

Z-CG 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 500. / 500. / 28.5
MISSION LIFETIME 12.0(MO)
MEAN MISSION DURATION 10.7(MO)
RELIABILITY .719

✓
484

GRAVITY WAVE DETECTOR NP1-1-5

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 1 1 1 1
WEIGHT 29.20 LBS VOLUME .88(FT**3)
RELIABILITY .9507
IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1112
EQUIPMENT QUANTITIES 12 2 4 9 1 1 1
WEIGHT 59.32 LBS VOLUME 3.03(FT**3)
DRY WEIGHT 31.97(LBS), EXPENDABLE WEIGHT
RELIABILITY .8966
IERR 10

503 701 1203 603
1 1 1 1
POWER REQUIREMENT .3 WATT
27.34(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403
EQUIPMENT QUANTITIES 1 1 1
WEIGHT 30.11 LBS VOLUME .54(FT**3)
RELIABILITY .9899
IERR 2

POWER REQUIREMENT 13.5 WATT

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227
EQUIPMENT QUANTITIES 1 1 1 1 2 1 1
WEIGHT 17.82 LBS VOLUME .22(FT**3)
RELIABILITY .9705
IERR*****

312
1
POWER REQUIREMENT 35.4 WATT

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 213 603 702
EQUIPMENT QUANTITIES 2 6 2 2 1
WEIGHT 74.75 LBS VOLUME 1.30(FT**3)
HARNESS WEIGHT 24.2(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9752

POWER DISSIPATION 294.3 WATT
32.4(LBS)

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 110.0 WATT

VI-85

GRAVITY WAVE DETECTOR NP1-1-5

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	10.7 (FT**2),	BATTERY RADIATOR AREA	1.0 (FT**2)
HEATER POWER	1017.4(BTU/HR),	TOTAL RADIATOR AREA	11.7 (FT**2)
HEAT PIPE	8635.6(WATT-IN),	BATTERY HEATER POWER	89.2(BTU/HR)
HEAT PIPE LENGTH	3.0 (FT)	TOTAL HEATER POWER	1106.6(BTU/HR)
STORED ENERGY	106.1 (BTU)	VARIABLE CONDUCTANCE H.P.	489.8(WATT-IN)
		AVERAGE HEAT LOAD	811.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	9.0
HEAT PIPES	3.2
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	6.8

TOTAL	21.6

IERR 1110011011

STRUCTURES					
SKIN THICKNESS	.011 (IN)				
STRINGER NO., THICKNESS, HT.	190.		4069.485 (IN),		.264 (IN)
FRAME NO., THICKNESS, HT.	5.		.076 (IN),		.379 (IN)
GRID BEAM THICKNESS	.098 (IN),	SPACING	2.770 (IN),	HEIGHT	1.385 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	43.2 (LBS)				
SOLAR ARRAY BOOM AND DRIVE WT.	20.6 (LBS)				
ADAPTER WEIGHT	23.6 (LBS)				

VI-86

GRAVITY WAVE DETECTOR NP1-1-5

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER - 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	1	1.6	.2	1.0
2203	CONTROL ELECTRNCS	1	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1112	TANK	1	2.7	.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

VI-87

GRAVITY WAVE DETECTOR NP1-1-5

***** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	6	2.3	.0	0.0
213	BATTERY	2	13.5	.1	0.0
603	BATTERY CHARGER	2	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	29.2
AUXILIARY PROPULSION	32.0
DATA PROCESSING	30.1
COMMUNICATIONS	17.8
BATTERIES	26.9
POWER CONTROL	47.8
SOLAR ARRAY	32.4
HARNESS	24.2
STRUCTURE	67.4
SOLAR ARRAY DRIVE	5.4
THERMAL CONTROL	21.6
DRY WEIGHT	584.8
PROPELLANT	27.3
SATELLITE ADAPTER	23.6

TOTAL LAUNCH WEIGHT 635.8

88-11

GRAVITY PROBE B/C NP1-1-6

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY FPCPULSICN

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 8105. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTL)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 151.51 WATTS
TOTAL SOLAR ARRAY AREA 113.53 SQ FT
INSTALLED BATTERY CAPACITY 8.00 AMP-HR
BEGINNING OF LIFE POWER 346.24 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1488.2 LBS (675.0 KG) LAUNCH WEIGHT = 1553.9 LBS (704.8 KG)

DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 55.9 IN. (1.42 M) 93.1 IN. (2.37 M) 93.1 IN. (2.37 M)

MISSION EQUIPMENT* 29.6 IN. (.75 M) 49.4 IN. (1.25 M) 49.4 IN. (1.25 M)

TOTAL SATELLITE 85.5 IN. (2.17 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 304.5 IYY = 1388002.9 IZZ = 1388002.9

CENTER OF GRAVITY 58.4 IN. (1.48 M) X-CG Y-CG Z-CG

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 280./ 280./ 90.0

MISSION LIFETIME 12.0 (MO)

MEAN MISSION DURATION 10.8 (MO)

RELIABILITY .734

VI-89

830

300 refrigerant
530 lb. payload cost opt.

GRAVITY PROBE B/C NF1-1-6

I * * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 32.05 LBS VOLUME 1.29(FT**3)
RELIABILITY .9636
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1116 507 701 1203 603
EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1
WEIGHT 104.76 LBS VOLUME 4.08(FT**3)
DRY WEIGHT 56.15(LBS), EXPENSABLE WEIGHT 48.60(LBS)
RELIABILITY .9078
IERR 1

1.0 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9933
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 13.37 LBS VOLUME .17(FT**3)
RELIABILITY .9565
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 204 303 1202
EQUIPMENT QUANTITIES 6 2 2 1
WEIGHT 60.90 LBS VOLUME 1.31(FT**3)
HARNESS WEIGHT 62.0(LBS), SOLAR ARRAY WEIGHT 55.8(LBS)
RELIABILITY .9811

POWER DISSIPATION 170.4 WATTS

MISSION EQUIPMENT

WEIGHT 830.00 LBS VOLUME 32.81(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 110.0 WATTS

VI-90

GRAVITY PROBE B/C NF1-1-5

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	6.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	604.4(BTU/HR),	TOTAL RADIATOR AREA	7.9 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	115.0(BTU/HR)
HEAT PIPE LENGTH	5.3 (FT)	TOTAL HEATER POWER	719.3(BTU/HR)
STORED ENERGY	64.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1106.2(WATT-IN)
		AVERAGE HEAT LOAD	516.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	21.4
HEAT PIPES	5.6
PHASE CHANGE MATERIAL	1.6
RADIATOR (PASSIVE)	4.2
TOTAL	32.8

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.116 (IN)			
STRINGER NO., THICKNESS, HT.	220.		3513.978 (IN),	.447 (IN)
FRAME NO., THICKNESS, HT.	5.		.128 (IN),	.641 (IN)
GRID BEAM THICKNESS	.144 (IN),	SPACING	4.053 (IN),	HEIGHT 2.026 (IN)
ENDCOVER THICKNESS - FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	64.2 (LBS)			
SOLAR APPAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	65.7 (LBS)			

VI-91

GRAVITY PROBE B/C NP1-1-6

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	4	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
507	TANK	1	6.7	.3	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM D ECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBNC ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-92

GRAVITY PROBE B/C NF1-1-6

* * * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
204	BATTERY	2	8.6	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	830.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	56.2
DATA PROCESSING	21.2
COMMUNICATIONS	13.4
BATTERIES	17.2
POWER CONTROL	43.7
CONVERTERS	15.9
SOLAR ARRAY	55.9
HARNESS	62.0
STRUCTURE	275.3
THERMAL CONTROL	32.8
DRY WEIGHT	1439.6
PROPELLANT	48.6
SATELLITE ADAPTER	65.7

TOTAL LAUNCH WEIGHT	1553.9

VI-93

EXPLORER NP1-1-8

***** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 *****

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .700000(DEG.)

AUXILIARY PROPELLSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 8105.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDFI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK--COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 109.45 WATTS
TOTAL SOLAR ARRAY AREA 41.93 SQ FT
INSTALLED BATTERY CAPACITY 6.00 AMP-HR
BEGINNING OF LIFE POWER 182.86 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 568.1 LBS (257.7 KG)

DIMENSIONS

EQUIPMENT BAY 34.0 IN.(.86 M)
MISSION EQUIPMENT 18.4 IN.(.47 M)
TOTAL SATELLITE 52.4 IN.(1.33 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

X-CG

CENTER OF GRAVITY 28.8 IN.(.73 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 1900./ 1900./ 90.0

MISSION LIFETIME 12.0(MO)

MEAN MISSION DURATION 10.8(MO)

RELIABILITY .736

LAUNCH WEIGHT =

590.1 LBS (267.6 KG)

HEIGHT

56.6 IN.(1.44 M)
30.7 IN.(.78 M)

WIDTH

56.6 IN.(1.44 M)
30.7 IN.(.78 M)

51.8 IYY = 256698.5

Y-CG

0.0 IN.(0.00 M)

IZZ = 256698.5

Z-CG

0.0 IN.(0.00 M)

VI-94

EXPLORER NP1-1-8

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 32.05 LBS VOLUME 1.29(FT**3)
RELIABILITY .9636
IERR 0

POWER REQUIREMENT 10.4 WATTS

UXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1116 507 701 1203 603
EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1
WEIGHT 104.76 LBS VOLUME 4.08(FT**3)
DRY WEIGHT 56.15(LBS), EXPENDABLE WEIGHT 48.60(LBS)
RELIABILITY .9078
IERR 1

1.0 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9933
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 203 103 309 401 503 603
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 22.72 LBS VOLUME .28(FT**3)
RELIABILITY .9543
IERR*****

POWER REQUIREMENT 17.5 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 202 303 1202
EQUIPMENT QUANTITIES 3 2 2 1
WEIGHT 50.07 LBS VOLUME 1.05(FT**3)
HARNESS WEIGHT 25.6(LBS), SOLAR ARRAY WEIGHT 20.6(LBS)
RELIABILITY .9862

POWER DISSIPATION 58.3 WATTS
20.6(LBS)

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 70.0 WATTS

VI-95

EXPLORER NP1-1-8

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	5.8 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	494.1 (BTU/HR),	TOTAL RADIATOR AREA	7.1 (FT**2)
HEAT PIPE	4301.6 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	3.3 (F1)	TOTAL HEATER POWER	616.3 (BTU/HR)
STORED ENERGY	63.5 (BTU)	VARIABLE CONDUCTANCE H.P.	677.9 (WATT-IN)
		AVERAGE HEAT LOAD	373.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	10.5
HEAT PIPES	3.4
PHASE CHANGE MATERIAL	1.6
RADIATOR (PASSIVE)	3.7
TOTAL	19.2

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.011 (IN)			
STRINGER NO., THICKNESS, HT.	211.		7568.804 (IN),	.283 (IN)
FRAME NO., THICKNESS, HT.	5.		.081 (IN),	.406 (IN)
GRID BEAM THICKNESS	.095 (IN),	SPACING	2.672 (IN),	HEIGHT 1.336 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	63.8 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	21.9 (LBS)			

95-1A

EXPLORER NP1-1-8

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPLR	1	2.8	.3	0.0
603	CONTROL ELECTPNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISCLATION VALVE	4	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
449	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
507	TANK	1	6.7	.3	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
309	TRANSMITTER	1	1.8	.0	8.8
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIFLEXER	1	3.1	.0	1.0

V1-97

EXPLORER NP1-1-8

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	3	4.2	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	56.2
DATA PROCESSING	21.2
COMMUNICATIONS	22.7
BATTERIES	19.0
POWER CONTROL	31.1
CONVERTERS	15.9
SOLAR ARRAY	20.6
HARNESS	25.6
STRUCTURE	71.9
THERMAL CONTROL	19.2
DRY WEIGHT	519.5
PROPELLANT	48.6
SATELLITE ADAPTER	21.9

TOTAL LAUNCH WEIGHT	590.1
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VI-98

SOLAR MAX MISSION NP2-1-

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
 POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 14476 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	.1250	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 349.64 WATTS
 TOTAL SOLAR ARRAY AREA 76.67 SQ FT
 INSTALLED BATTERY CAPACITY 24.00 AMP-HR
 BEGINNING OF LIFE POWER 944.33 WATTS

VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 1898.7 LBS (861.2 KG) LAUNCH WEIGHT = 1971.0 LBS (894.1 KG)
 DIMENSIONS LENGTH HEIGHT WIDTH
 EQUIPMENT BAY 32.4 IN. (.82 M) 54.1 IN. (1.37 M) 54.1 IN. (1.37 M)
 MISSION EQUIPMENT 34.0 IN. (.86 M) 56.6 IN. (1.44 M) 56.6 IN. (1.44 M)
 TOTAL SATELLITE 66.4 IN. (1.69 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 214.3 IYY = 874777.9 IZZ = 1229236.3
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 40.1 IN. (1.02 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 310. / 310. / 28.5
 MISSION LIFETIME 24.10 (MO)
 MEAN MISSION DURATION 21.3 (MO)
 RELIABILITY .1717

65-1A

SOLAR MAX MISSION NP2-1-1

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1309

EQUIPMENT QUANTITIES 2 2 1 1

WEIGHT 41.30 LBS VOLUME 1.21 (FT**3)

RELIABILITY .9707

IERR 0

POWER REQUIREMENT 79.7 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1124

EQUIPMENT QUANTITIES 12 4 5 9 1 1 1

WEIGHT 148.06 LBS VOLUME 5.11 (FT**3)

DRY WEIGHT 62.14 (LBS), EXPENDABLE WEIGHT

RELIABILITY .9109

IERR 10

509 701 1203 603
1 2 1 1
POWER REQUIREMENT
85.92 (LBS)

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 1 1 1

WEIGHT 30.11 LBS VOLUME .54 (FT**3)

RELIABILITY .9799

IERR 2

POWER REQUIREMENT 13.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603 203

EQUIPMENT QUANTITIES 1 1 2 1 2 1 1

WEIGHT 41.42 LBS VOLUME .51 (FT**3)

RELIABILITY .9775

IERR*****

312
2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 221 603 702

EQUIPMENT QUANTITIES 2 9 2 2 1

WEIGHT 94.29 LBS VOLUME 1.43 (FT**3)

HARNESS WEIGHT 77.3 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9409

POWER DISSIPATION 492.9 WATTS
53.4 (LBS)

MISSION EQUIPMENT

WEIGHT 1250.00 LBS VOLUME 49.40 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT 130.0 WATTS

VI-100

SOLAR MAX MISSION NP2-1-1

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	16.0 (FT**2),	BATTERY RADIATOR AREA	1.6 (FT**2)
HEATER POWER	1539.8 (BTU/HR),	TOTAL RADIATOR AREA	16.7 (FT**2)
HEAT PIPE	12886.6 (WATT-IN),	BATTERY HEATER POWER	49.8 (BTU/HR)
HEAT PIPE LENGTH	4.1 (FT)	TOTAL HEATER POWER	1589.6 (BTU/HR)
STORED ENERGY	105.6 (BTU)	VARIABLE CONDUCTANCE H.P.	672.2 (WATT-IN)
		AVERAGE HEAT LOAD	882.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	11.8
HEAT PIPES	4.4
PHASE CHANGE MATERIAL	2.6
RADIATOR (PASSIVE)	10.2
TOTAL	29.0

IERR 1100010011

STRUCTURES			
SKIN THICKNESS	.020 (IN)		
STRINGER NO., THICKNESS, HT.	153. ,	3592.097 (IN),	.375 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.108 (IN),	.538 (IN)
GRID BEAM THICKNESS	.175 (IN),	SPACING 4.918 (IN),	HEIGHT 2.459 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	72.3 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	24.1 (LBS)		
ADAPTER WEIGHT	72.4 (LBS)		

VI-101

SOLAR MAX MISSION NP2-1-1

* * *. ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1309	REACTION WHEEL	1	8.5	.1	1.1

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-102

SOLAR MAX MISSION NP2-1-1

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
221	BATTERY	2	19.8	.1	0.0
603	BATTERY CHARGER	2	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1250.0
STABILITY AND CONTROL	41.3
AUXILIARY PROPULSION	62.1
DATA PROCESSING	30.1
COMMUNICATIONS	41.4
BATTERIES	39.6
POWER CONTROL	54.7
SOLAR ARRAY	53.4
HARNESS	77.3
STRUCTURE	124.9
SOLAR ARRAY DRIVE	8.9
THERMAL CONTROL	29.0
DRY WEIGHT	1812.8
PROPELLANT	85.9
SATELLITE ADAPTER	72.4

TOTAL LAUNCH WEIGHT 1971.0

VI-103

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .60C000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 9335. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 198.17 WATTS
TOTAL SOLAR ARRAY AREA 67.91 SQ FT
INSTALLED BATTERY CAPACITY 34.00 AMP-HR
BEGINNING OF LIFE POWER 219.67 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 1170.1 LBS (530.7 KG) LAUNCH WEIGHT = 1217.4 LBS (552.2 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	43.2 IN. (1.10 M)	72.0 IN. (1.83 M)	72.0 IN. (1.83 M)	
MISSION EQUIPMENT	26.6 IN. (.68 M)	44.3 IN. (1.13 M)	44.3 IN. (1.13 M)	
TOTAL SATELLITE	69.8 IN. (1.77 M)			

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 160.0 IYY = 807937.0 IZZ = 807937.0

CENTER OF GRAVITY		X-CG	Y-CG	Z-CG
42.8 IN. (1.09 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)	

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 100000./*****/ 28.5
MISSION LIFETIME 12.0 (MO)
MEAN MISSION DURATION 10.7 (MO)
RELIABILITY .722

VI-104

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

***** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 *****

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CCODE IDENTIFIER	203	303	403	603	803	1413
EQUIPMENT QUANTITIES	1	1	1	1	1	1
WEIGHT	29.28 LBS	VOLUME		1.18(FT**3)		
RELIABILITY		.9591				
IERR	0					

POWER REQUIREMENT 9.4 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONO PROPELLANT

EQUIPMENT CCODE IDENTIFIER	834	834	906	1003	499	203	1116
EQUIPMENT QUANTITIES	6	2	4	9	1	1	1
WEIGHT	121.03 LBS	VOLUME		4.16(FT**3)			
DRY WEIGHT	64.91(LBS)	EXPENDABLE WEIGHT					
RELIABILITY		.9101					
IERR	11						

509 701 1203 603
1 1 1 1
POWER REQUIREMENT 1.0 WATT
56.11(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CCODE IDENTIFIER	203	403
EQUIPMENT QUANTITIES	1	1
WEIGHT	21.18 LBS	VOLUME
RELIABILITY		.39(FT**3)
IERR	1	

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

EQUIPMENT CCODE IDENTIFIER	206	308	401	503	227
EQUIPMENT QUANTITIES	1	1	1	1	1
WEIGHT	19.77 LBS	VOLUME		1.43(FT**3)	
RELIABILITY		.9415			
IERR	*****				

POWER REQUIREMENT 77.2 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CCODE IDENTIFIER	103	233	315	1202
EQUIPMENT QUANTITIES	3	2	2	1
WEIGHT	116.51 LBS	VOLUME		1.68(FT**3)
HARNESS WEIGHT		48.6(LBS)		SOLAR ARRAY WEIGHT
RELIABILITY		.9828		

POWER DISSIPATION 3.3 WATTS
33.4(LBS)

MISSION EQUIPMENT

WEIGHT	600.00 LBS	VOLUME	23.73(FT**3)
RELIABILITY		.9000	

POWER REQUIREMENT 100.0 WATTS

V1-105

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	6.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	441.3 (BTU/HR),	TOTAL RADIATOR AREA	7.4 (FT**2)
HEAT PIPE	10375.2 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	556.3 (BTU/HR)
STORED ENERGY	88.3 (BTU)	VARIABLE CONDUCTANCE H.P.	903.1 (WATT-IN)
		AVERAGE HEAT LOAD	675.8 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	15.0
HEAT PIPES	4.6
PHASE CHANGE MATERIAL	2.2
RADIATOR (PASSIVE)	3.9
TOTAL	25.7

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.015 (IN)			
STRINGER NO., THICKNESS, HT.	201.	825452.780 (IN),	.379 (IN)	
FRAME NO., THICKNESS, HT.	5.	.109 (IN),	.544 (IN)	
GRID BEAM THICKNESS	.134 (IN),	SPACING 3.766 (IN),	HEIGHT 1.883 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	84.9 (LBS)			
SOLAR ARRAY BECM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	47.3 (LBS)			

VI-106

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTRPOL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGLLATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
398	XTMR	1	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

VI-107

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	3	4.2	.1	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	64.9
DATA PROCESSING	21.2
COMMUNICATIONS	19.8
BATTERIES	68.3
POWER CONTROL	48.2
CONVERTERS	15.9
SOLAR ARRAY	33.4
HARNESS	48.6
STRUCTURE	154.7
THERMAL CONTROL	25.7
DRY WEIGHT	1114.0
PROPELLANT	56.1
SATELLITE ADAPTER	47.3

TOTAL LAUNCH WEIGHT	1217.4

801-1A

EXPLORER (DELTA CLASS) NP2-1-3

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = 1.000000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 6055 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.0 (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
32.
10.
8.
3.
1250
64.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 4.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 122.34 WATTS
TOTAL SOLAR ARRAY AREA 100.79 SQ FT
INSTALLED BATTERY CAPACITY 6.00 AMP-HR
BEGINNING OF LIFE POWER 307.41 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 708.0 LBS (321.2 KG)

DIMENSIONS LENGTH

EQUIPMENT BAY 52.7 IN. (1.34 M)

MISSION EQUIPMENT 18.3 IN. (.46 M)

TOTAL SATELLITE 70.9 IN. (1.80 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

CENTER OF GRAVITY 42.3 IN. (1.07 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION: 1900. / 140. / 90.0

MISSION LIFETIME 12.0 (MO)

MEAN MISSION DURATION 10.7 (MO)

RELIABILITY .724

LAUNCH WEIGHT =

740.2 LBS (335.7 KG)

HEIGHT

WIDTH

87.8 IN. (2.23 M)

87.8 IN. (2.23 M)

30.5 IN. (.77 M)

30.5 IN. (.77 M)

134.0 IVY = 649248.7

IZZ = 649248.7

Y-CG 0.0 IN. (0.00 M)

Z-CG 0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

VI-109

EXPLORER (DELTA CLASS) NP2-1-3

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413
EQUIPMENT QUANTITIES	1	1	1	1	1	1
WEIGHT	32.05 LBS				1.29 (FT**3)	
RELIABILITY		.9636				
IERR	0					

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1116	506	701	1203	603
EQUIPMENT QUANTITIES	6	2	4	9	1	1	1	1	1	1	1
WEIGHT	89.43 LBS				3.80 (FT**3)						
DRY WEIGHT	53.03 (LBS)				EXPENDABLE WEIGHT			36.40 (LBS)			
RELIABILITY		.9079									
IERR	11										

1.0 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	403
EQUIPMENT QUANTITIES	1	1	1
WEIGHT	30.11 LBS		
RELIABILITY		.9899	
IERR	2		

POWER REQUIREMENT 13.9 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312
EQUIPMENT QUANTITIES	1	1	1	1	1	1	1	1
WEIGHT	16.32 LBS				.20 (FT**3)			
RELIABILITY		.9448						
IERR	*****							

POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	103	202	303	1202
EQUIPMENT QUANTITIES	5	2	2	1
WEIGHT	58.47 LBS			
HARNESS WEIGHT		33.0 (LBS)		
RELIABILITY		.9828		

POWER DISSIPATION 159.6 WATTS
49.5 (LBS)

MISSION EQUIPMENT

WEIGHT	195.00 LBS		
RELIABILITY		.9000	

POWER REQUIREMENT 62.0 WATTS

VI-110

EXPLORER (DELTA CLASS) NP2-1-3

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	5.9 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	541.5 (BTU/HR),	TOTAL RADIATOR AREA	7.2 (FT**2)
HEAT PIPE	6509.2 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	663.7 (BTU/HR)
STORED ENERGY	77.4 (BTU)	VARIABLE CONDUCTANCE H.P.	917.8 (WATT-IN)
		AVERAGE HEAT LOAD	417.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	17.6
HEAT PIPES	4.7
PHASE CHANGE MATERIAL	1.9
RADIATOR (PASSIVE)	3.7
TOTAL	27.9

IERR 1110011011

STRUCTURES			
SKIN THICKNESS	.011 (IN)		
STRINGER NO., THICKNESS, HT.	260.	3125.798 (IN),	.356 (IN)
FRAME NO., THICKNESS, HT.	5.	.102 (IN),	.511 (IN)
GRID BEAM THICKNESS	.097 (IN),	2.735 (IN),	1.367 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	0.000 (IN),	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	62.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	32.1 (LBS)		

VI-111

EXPLORER (DELTA CLASS) NP2-1-3

***** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 *****

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

VI-112

EXPLORER (DELTA CLASS) NP2-1-3

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	5	4.2	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	195.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	53.0
DATA PROCESSING	30.1
COMMUNICATIONS	16.3
BATTERIES	19.0
POWER CONTROL	39.5
CONVERTERS	15.9
SOLAR ARRAY	49.5
HARNESS	33.0
STRUCTURE	176.2
THERMAL CONTROL	27.9
DRY WEIGHT	671.6
PROPELLANT	36.4
SATELLITE ADAPTER	32.1
TOTAL LAUNCH WEIGHT	740.2

VI-113

EXPLORER (SCOUT CLASS) NP2-1-4

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION -- SPIN CONTROL
 POINTING ACCURACY = 2.000000 (DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 6055. (LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0. (IPS)
 CDPI TABLE
 NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME
 COMMUNICATIONS
 CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)
 ELECTRICAL POWER
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 141.17 WATTS
 TOTAL SOLAR ARRAY AREA 66.48 SQ FT
 INSTALLED BATTERY CAPACITY 6.00 AMP-HR
 BEGINNING OF LIFE POWER 215.03 WATTS
 VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 589.5 LBS (267.4 KG)
 DIMENSIONS
 EQUIPMENT BAY 42.8 IN. (1.09 M)
 MISSION EQUIPMENT 15.6 IN. (.40 M)
 TOTAL SATELLITE 58.3 IN. (1.48 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 81.9 IYY = 375214.0 IZZ = 375214.0
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 31.2 IN. (.79 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)
 RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 20000. / 1000. / 28.5
 MISSION LIFETIME 12.0 (MO)
 MEAN MISSION DURATION 10.6 (MO)
 RELIABILITY .710

ENGINEERING DATA	MISSION EQUIPMENT DATA
32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
1250	0.0000
64.	0.

VI-114

EXPLORER (SCOUT CLASS) NP2-1-4

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 29.28 LBS VOLUME 1.18 (FT**3)
RELIABILITY .9591
IERR 0

POWER REQUIREMENT 9.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 506 701 1203 603
EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1 1
WEIGHT 89.43 LBS VOLUME 3.80 (FT**3)
DRY WEIGHT 53.03 (LBS), EXPENDABLE WEIGHT 36.40 (LBS)
RELIABILITY .9080
IERR 11

1.0 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39 (FT**3)
RELIABILITY .9933
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 398 401 503 227
EQUIPMENT QUANTITIES 1 1 1 1 1
WEIGHT 28.67 LBS VOLUME 1.41 (FT**3)
RELIABILITY .9394
IERR*****

POWER REQUIREMENT 77.2 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 102 202 303 1202
EQUIPMENT QUANTITIES 12 2 2 1
WEIGHT 97.47 LBS VOLUME 2.18 (FT**3)
HARNESS WEIGHT 34.5 (LBS), SOLAR ARRAY WEIGHT 32.7 (LBS)
RELIABILITY .9708

POWER DISSIPATION 56.1 WATTS

MISSION EQUIPMENT

WEIGHT 120.00 LBS VOLUME 4.75 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 43.0 WATTS

VI-115

EXPLORER (SCOUT CLASS) NP2-1-4

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	6.8 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	483.2 (BTU/HR),	TOTAL RADIATOR AREA	8.1 (FT**2)
HEAT PIPE	6174.5 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	3.6 (FT)	TOTAL HEATER POWER	605.5 (BTU/HR)
STORED ENERGY	88.3 (BTU)	VARIABLE CONDUCTANCE H.P.	754.5 (WATT-IN)
		AVERAGE HEAT LOAD	481.4 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	13.1
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	2.2
RADIATOR (PASSIVE)	4.3
TOTAL	23.4

IERR 1110011011

STRUCTURES				
SKIN THICKNESS	.011 (IN)			
STRINGER NO., THICKNESS, HT.	238.		4920.000 (IN),	.315 (IN)
FRAME NO., THICKNESS, HT.	5.		.090 (IN),	.452 (IN)
GRID BEAM THICKNESS	.094 (IN),	SPACING	2.637 (IN),	HEIGHT 1.318 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	73.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.10 (LBS)			
ADAPTER WEIGHT	24.0 (LBS)			

VI-116

EXPLORER (SCOUT CLASS) NP2-1-4

* * * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
634	THRUSTER	2	.7	.0	.1
506	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
1203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	1	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

VI-117

EXPLORER (SCOUT CLASS) NP2-1-4

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	12	5.0	.1	0.0
202	BATTERY	2	9.5	.1	0.0
203	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	120.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	28.7
BATTERIES	19.0
POWER CONTROL	78.5
CONVERTERS	15.9
SOLAR ARRAY	32.7
FARNES	34.5
STRUCTURE	112.9
THERMAL CONTROL	23.4
DRY WEIGHT	553.1
PROPELLANT	36.4
SATELLITE ADAPTER	24.0

TOTAL LAUNCH WEIGHT	613.5

811-1A

LARGE SOLAR OBS NP2-1-5

***** SYSTEM DESCRIPTION -- DESIGN NUMBER 1*****

STABILIZATION AND CONTROL
 CONFIGURATION -- THREE AXIS MASS EXPULSION
 POINTING ACCURACY = .200000 (DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 418355 (LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	32.	128.
MAIN FRAME SAMPLE RATE	125.	100.
MAIN FRAME WORD LENGTH	13.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 64.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 928.52 WATTS
 TOTAL SOLAR ARRAY AREA 217.62 SQ FT
 INSTALLED BATTERY CAPACITY 66.00 AMP-HR
 BEGINNING OF LIFE POWER 2680.56 WATTS

VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 17317.6 LBS (7855.1 KG) LAUNCH WEIGHT = 17689.9 LBS (8024.0 KG)
 DIMENSIONS
 EQUIPMENT BAY 63.3 IN. (1.61 M) 105.5 IN. (2.68 M) 105.5 IN. (2.68 M)
 MISSION EQUIPMENT 69.8 IN. (1.77 M) 116.4 IN. (2.96 M) 116.4 IN. (2.96 M)
 TOTAL SATELLITE 133.1 IN. (3.38 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 5678.7 IYY = 31044736.0 IZZ = 35179815.0
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 75.9 IN. (1.93 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 190.0/ 190.0/ 28.5
 MISSION LIFETIME 24.0 (MO)
 MEAN MISSION DURATION 21.1 (MO)
 RELIABILITY .702

VI-119

LARGE SOLAR OBS NF2-1-5

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- THREE AXIS MASS EXPULSION

EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803

EQUIPMENT QUANTITIES 2 3 1 2 2
WEIGHT 89.10 LBS VOLUME 1.87(FT**3)
RELIABILITY .9835
IERR 0

POWER REQUIREMENT 56.0 WATT

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1130 536 701 1203 603
EQUIPMENT QUANTITIES 6 2 5 9 2 1 13 3 2 1 1
WEIGHT 3181.49 LBS VOLUME 57.92(FT**3) POWER REQUIREMENT 1.0 WATT
DRY WEIGHT 736.51(LBS), EXPENDABLE WEIGHT 2444.98(LBS)
RELIABILITY .8352
IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 406
EQUIPMENT QUANTITIES 2 2 2
WEIGHT 57.72 LBS VOLUME .86(FT**3) POWER REQUIREMENT 11.5 WATT
RELIABILITY .9995
IERR 2

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603 203 312
EQUIPMENT QUANTITIES 1 2 2 2 3 2 1 2
WEIGHT 51.94 LBS VOLUME .65(FT**3) POWER REQUIREMENT 35.4 WATT
RELIABILITY .9892
IERR*****

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 410 531 260 650 702
EQUIPMENT QUANTITIES 2 11 2 3 2
WEIGHT 238.52 LBS VOLUME 4.18(FT**3) POWER DISSIPATION 1462.9 WATT
HARNESS WEIGHT 1311.5(LBS), SOLAR ARRAY WEIGHT 151.5(LBS)
RELIABILITY .9536

MISSION EQUIPMENT

WEIGHT 10900.00 LBS VOLUME 429.82(FT**3) POWER REQUIREMENT 720.0 WATT
RELIABILITY .9000

X1-120

LARGE SOLAR CBS MP2-1-5

* * * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	47.5 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	4568.5 (BTU/HR),	TOTAL RADIATOR AREA	48.4 (FT**2)
HEAT PIPE	82249.3 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	8.3 (FT)	TOTAL HEATER POWER	4658.5 (BTU/HR)
STORED ENERGY	111.5 (BTU)	VARIABLE CONDUCTANCE H.P.	1347.7 (WATT-IN)
		AVERAGE HEAT LOAD	2809.4 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		34.6
HEAT PIPES		8.7
PHASE CHANGE MATERIAL		2.8
RADIATOR (ACTIVE)		87.9
TOTAL		134.1

IERR 1100010011

STRUCTURES

SKIN THICKNESS	.060 (IN)		
STRINGER NO., THICKNESS, HT.	123. ,	3270.587 (IN),	.910 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.261 (IN),	1.307 (IN)
GRID BEAM THICKNESS	.528 (IN),	SPACING 14.867 (IN),	HEIGHT 7.434 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTLR 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	724.17 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	40.4 (LBS)		
ADAPTER WEIGHT	372.3 (LBS)		

VI-121

LARGE SOLAR OBS NP2-1-5

* * * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	FATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	2	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	4	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	13	20.0	3.2	0.0
536	TANK	3	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1293	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMMD DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	2	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

71-122

LARGE SOLAR OBS NP2-1-5

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
413	DISCHGE REGULATOR	2	24.0	.5	0.0
531	SHUNT REGULATOR	11	4.3	.1	0.0
260	BATTERY	2	47.5	.2	0.0
650	BATTERY CHARGER	3	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	10900.0
STABILITY AND CONTROL	79.1
AUXILIARY PROPULSION	736.5
DATA PROCESSING	57.7
COMMUNICATIONS	51.9
BATTERIES	95.0
POWER CONTROL	143.5
CONVERTERS	10.0
SOLAR ARRAY	151.5
HARNESS	1311.5
STRUCTURE	1176.6
SOLAR ARRAY DRIVE	25.2
THERMAL CONTROL	134.1
DRY WEIGHT	14872.6
PROPELLANT	2445.0
SATELLITE ADAPTER	372.3

TOTAL LAUNCH WEIGHT 17689.9

41-123

OUTER PLANET ORB PROBE (JUP) NL1-1-1

* * * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
 CONFIGURATION -- THREE AXIS MASS EXPULSION
 POINTING ACCURACY = .300000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 278675.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR
 COMPUTER OPERATIONS RATE = 0.(IPS)
 CDPI TABLE

ENGINEERING DATA

MISSION EQUIPMENT DATA

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

64.	0.
64.	0.
100.	0.
13.	0.
5.	0.
1.0000	0.0000
64.	0.

COMMUNICATIONS
 CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 128.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER
 CONFIGURATION -- RTG POWER GENERATION
 POWER REQUIREMENT 267.16 WATTS
 INSTALLED BATTERY CAPACITY 0.00 AMP-HR
 BEGINNING OF LIFE POWER 570.94 WATTS

VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 3523.8 LBS (1598.4 KG)

LAUNCH WEIGHT = 3648.9 LBS (1655.1 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	67.9 IN. (1.72 M)	113.1 IN. (2.87 M)	113.1 IN. (2.87 M)	
MISSION EQUIPMENT	18.0 IN. (.46 M)	30.0 IN. (.76 M)	30.0 IN. (.76 M)	
TOTAL SATELLITE	85.8 IN. (2.18 M)			

MOMENTS OF INERTIA (SLUGS*FT*2) IXX = 1356.7 IYY = 4675291.3 IZZ = 4675291.3

CENTER OF GRAVITY		X-CG	Y-CG	Z-CG
	38.7 IN. (.98 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)

RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 5000./ 5000./ 28.5
 MISSION LIFETIME 84.0(MO)
 MEAN MISSION DURATION 73.4(MO)
 RELIABILITY .564

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VI-125

OUTER PLANET ORB PROBE (JUP) NL1-1-1

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - THREE AXIS MASS EXPULSION

EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803

EQUIPMENT QUANTITIES 2 3 1 2 2

WEIGHT 89.10 LBS VOLUME 1.87(FT**3)

RELIABILITY

IERR 0

POWER REQUIREMENT 56.0 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124 536 701 1203 603

EQUIPMENT QUANTITIES 6 2 5 9 2 1 13

WEIGHT 2107.28 LBS VOLUME 43.18(FT**3)

DRY WEIGHT 474.48(LBS), EXPENDABLE WEIGHT

RELIABILITY

IERR 1

POWER REQUIREMENT 1632.80(LBS) .3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 406

EQUIPMENT QUANTITIES 2 2

WEIGHT 39.86 LBS VOLUME .56(FT**3)

RELIABILITY

IERR 1

POWER REQUIREMENT 8.5 WATTS

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 312 401 503 227

EQUIPMENT QUANTITIES 2 2 2 3 2

WEIGHT 19.74 LBS VOLUME .23(FT**3)

RELIABILITY

IERR*****

POWER REQUIREMENT 23.0 WATTS

ELECTRICAL POWER

CONFIGURATION - - RTG POWER GENERATION

EQUIPMENT CODE IDENTIFIER ***

EQUIPMENT QUANTITIES 0

WEIGHT 175.00 LBS VOLUME

HARNESS WEIGHT 227.9(LBS),

RELIABILITY

IERR 1.0000

35.00(FT**3)
RTG WEIGHT

POWER DISSIPATION
175.0(LBS)

0.0 WATTS

MISSION EQUIPMENT

WEIGHT 185.00 LBS

RELIABILITY

VOLUME

.9000

.32(FT**3)

POWER REQUIREMENT

90.0 WATTS

VI-126

OUTER PLANET ORB PROBE (JUP) NL1-1-1

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	6.9 (FT**2),	NUCLEAR POWER RADIATOR AREA	3.9 (FT**2)
HEATER POWER	639.9(BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	11445.2(WATT-IN),	BATTERY HEATER POWER	0.0(BTU/HR)
HEAT PIPE LENGTH	5.4 (FT)	TOTAL HEATER POWER	639.9(BTU/HR)
STORED ENERGY	90.6 (BTU)	VARIABLE CONDUCTANCE H.P.	0.0(WATT-IN)
		AVERAGE HEAT LOAD	606.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	25.2
HEAT PIPES	5.6
PHASE CHANGE MATERIAL	2.3
RADIATOR (PASSIVE)	4.4
TOTAL	37.5

IERR 1110011011

STRUCTURES

SKIN THICKNESS	.027 (IN)		
STRINGER NO., THICKNESS, HT.	187.	16804.806 (IN),	.637 (IN)
FRAME NO., THICKNESS, HT.	5.	.183 (IN),	.915 (IN)
GRID BEAM THICKNESS	.241 (IN),	SPACING 6.799 (IN),	HEIGHT 3.400 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	658.5 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	125.1 (LBS)		

VI-127

OUTER PLANET ORB PROBE (JUP) NL1-1-1

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	RATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	2	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	4	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	13	11.5	2.4	0.0
536	TANK	2	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMMD DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
27	ANTENNA	2	.8	.0	0.0
12	TRANSMITTER	2	2.2	.0	15.8
701	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
227	ANTENNA	2	.8	.0	0.0

821-1A

OUTER PLANET ORB PROBE (JUP) NL1-1-1

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	185.0
STABILITY AND CONTROL	79.1
AUXILIARY PROPULSION	474.5
DATA PROCESSING	39.9
COMMUNICATIONS	19.7
BATTERIES	0.0
CONVERTERS	10.0
NUCLEAR POWER UNIT	175.0
HARNESS	227.9
STRUCTURE	642.4
THERMAL CONTROL	37.5
DRY WEIGHT	1891.0
PROPELLANT	1632.8
SATELLITE ADAPTER	125.1

TOTAL LAUNCH WEIGHT	3648.9

VI+129

VENUS ORB IMAG RADAR (VOIR) NL1-1-2

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
CONFIGURATION -- THREE AXIS MASS EXPULSION
POINTING ACCURACY = .250000(DEG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 813981.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

64.
64.
100.
13.
6.
1.0000
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 128.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 906.46 WATTS
TOTAL SOLAR ARRAY AREA 116.34 SQ FT
INSTALLED BATTERY CAPACITY 72.00 AMP-HR
BEGINNING OF LIFE POWER 1433.01 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 8631.3 LBS (3915.1 KG) LAUNCH WEIGHT = 8885.6 LBS (4030.4 KG)
DIMENSIONS
EQUIPMENT BAY 93.2 IN.(2.37 M) HEIGHT 120.0 IN.(3.05 M) WIDTH 120.0 IN.(3.05 M)
MISSION EQUIPMENT 21.1 IN.(.54 M) 35.2 IN.(.89 M) 35.2 IN.(.89 M)
TOTAL SATELLITE 114.3 IN.(2.90 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 3927.7 IYY = 15270188.8 IZZ = 16641093.7

X-CG

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 5000./ 5000./ 28.5
MISSION LIFETIME 18.0(MO)
MEAN MISSION DURATION 16.5(MO)
RELIABILITY .703

Y-CG 0.0 IN.(0.00 M)

Z-CG 0.0 IN.(0.00 M)

VL-130

VENUS ORB IMAG RADAR (VOIR) NLI-1-2

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- THREE AXIS MASS EXPULSION

EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803

EQUIPMENT QUANTITIES 2 3 2 2 2

WEIGHT 105.00 LBS VOLUME 2.30(FT**3)

RELIABILITY

IERR 0

POWER REQUIREMENT

56.0 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124 536 701 1203 603

EQUIPMENT QUANTITIES 6 2 5 9 2 1 37 5 2 1 1

WEIGHT 5971.08 LBS VOLUME 114.86(FT**3)

DRY WEIGHT 1201.68(LBS), EXPENDABLE WEIGHT

RELIABILITY

IERR 1

POWER REQUIREMENT 4769.40(LBS)

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 406

EQUIPMENT QUANTITIES 2 2

WEIGHT 39.86 LBS VOLUME .56(FT**3)

RELIABILITY

IERR 1

POWER REQUIREMENT

8.9 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 203 103 354 401 503 618

EQUIPMENT QUANTITIES 2 2 4 2 3 2

WEIGHT 51.14 LBS VOLUME .60(FT**3)

RELIABILITY

IERR*****

POWER REQUIREMENT

97.7 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 418 530 263 650 702

EQUIPMENT QUANTITIES 3 11 2 3 2

WEIGHT 242.72 LBS VOLUME 4.81(FT**3)

HARNESS WEIGHT 572.0(LBS), SOLAR ARRAY WEIGHT

RELIABILITY

.9714

POWER DISSIPATION 81.0(LBS)

368.6 WATTS

MISSION EQUIPMENT

WEIGHT 300.00 LBS

RELIABILITY

VOLUME 11.87(FT**3)

.9000

POWER REQUIREMENT

400.0 WATTS

VI-131

VENUS ORB IMAG RADAR (VOIR) NL1-1-2

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	26.1 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	2275.5 (BTU/HR),	TOTAL RADIATOR AREA	26.6 (FT**2)
HEAT PIPE	48201.5 (WATT-IN),	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	7.1 (FT)	TOTAL HEATER POWER	2308.8 (BTU/HR)
STORED ENERGY	126.0 (BTU)	VARIABLE CONDUCTANCE H.P.	1157.0 (WATT-IN)
		AVERAGE HEAT LOAD	1917.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	33.9
HEAT PIPES	7.5
PHASE CHANGE MATERIAL	3.2
RADIATOR (PASSIVE)	16.5

TOTAL	61.1

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.046 (IN)			
STRINGER NO., THICKNESS, HT.	148.		16804.806 (IN),	.856 (IN)
FRAME NO., THICKNESS, HT.	6.		.246 (IN),	1.229 (IN)
GRID BEAM THICKNESS	.381 (IN),		SPACING 10.725 (IN),	HEIGHT 5.362 (IN)
ENDCLVER THICKNESS- FORWARD	.030 (IN),		CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	1323.2 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	28.6 (LBS)			
ADAPTER WEIGHT	254.3 (LBS)			

VI-132

VENUS ORB IMAG RADAR (VOIR) NL1-1-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
418	DISCHGE REGULATOR	3	24.0	.6	0.0
530	SHUNT REGULATOR	11	2.2	.0	0.0
263	BATTERY	2	49.5	.4	0.0
650	BATTERY CHARGER	3	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	300.0
STABILITY AND CONTROL	95.0
AUXILIARY PROPULSION	1201.7
DATA PROCESSING	39.9
COMMUNICATIONS	51.1
BATTERIES	99.0
POWER CONTROL	143.7
CONVERTERS	10.0
SOLAR ARRAY	81.0
HARNESS	572.0
STRUCTURE	1193.9
SOLAR ARRAY DRIVE	13.4
THERMAL CONTROL	61.1
DRY WEIGHT	3861.9
PROPELLANT	4769.4
SATELLITE ADAPTER	254.3

TOTAL LAUNCH WEIGHT 8885.6

VI-133

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

ENGINEERING DATA	MISSION EQUIPMENT DATA
64.	0.
64.	0.
100.	0.
13.	0.
5.	0.
1.0000	0.0000
64.	0.

ELECTRICAL POWER - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY	
CONFIGURATION	
POWER REQUIREMENT	445.08 WATTS
TOTAL SOLAR ARRAY AREA	60.10 SQ FT
INSTALLED BATTERY CAPACITY	36.00 AMP-HR
BEGINNING OF LIFE POWER	740.31 WATTS

CENTER OF GRAVITY	7.2 IN.	.18 H ¹	0.
RELIABILITY			
CONFIGURATION - - SINGLE SYSTEM			
APOGEE/PERIGEE/INCLINATION	5000.7	2000.7	0.0
MISSION LIFETIME	28.0 (MO)		
MEAN MISSION DURATION	23.3 (MO)		
RELIABILITY	.604		

MERCURY ORBITER/SEPS NL1-1-3

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- THREE AXIS MASS EXPULSION

EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1801

EQUIPMENT QUANTITIES 1 2 1 1 1

WEIGHT 53.30 LBS

VOLUME

1.23(FT**3)

POWER REQUIREMENT

56.0 WATTS

RELIABILITY

.8849

IERR

0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1130

EQUIPMENT QUANTITIES 6 2 5 9 1 1 2

WEIGHT 344.47 LBS

VOLUME

9.90(FT**3)

POWER REQUIREMENT

1.0 WATTS

DRY WEIGHT

101.61(LBS)

EXPENDABLE WEIGHT

242.86(LBS)

RELIABILITY

.8587

IERR

1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 406

EQUIPMENT QUANTITIES 1 1

WEIGHT 19.93 LBS

VOLUME

.28(FT**3)

POWER REQUIREMENT

0.5 WATTS

RELIABILITY

.9669

IERR

1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 203 103 354 401 503 618

EQUIPMENT QUANTITIES 1 1 3 1 2 1

WEIGHT 29.07 LBS

VOLUME

.33(FT**3)

POWER REQUIREMENT

97.7 WATTS

RELIABILITY

.9700

IERR*****

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 236 609 702

EQUIPMENT QUANTITIES 2 7 2 2 1

WEIGHT 115.13 LBS

VOLUME

1.82(FT**3)

POWER DISSIPATION

181.0 WATTS

HARNESS WEIGHT

42.1(LBS), SOLAR ARRAY WEIGHT

41.9(LBS)

RELIABILITY

.9420

MISSION EQUIPMENT

WEIGHT 150.00 LBS

VOLUME

37.57(FT**3)

POWER REQUIREMENT

100.0 WATTS

RELIABILITY

.9000

71-135

MERCURY ORBITER/SEPS NL1-1-3

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	12.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	919.5(BTU/HR),	TOTAL RADIATOR AREA	13.1 (FT**2)
HEAT PIPE	16478.0(WATT-IN),	BATTERY HEATER POWER	90.0(BTU/HR)
HEAT PIPE LENGTH	5.2 (FT)	TOTAL HEATER POWER	1009.5(BTU/HR)
STORED ENERGY	117.5 (BTU)	VARIABLE CONDUCTANCE H.P.	845.2(WATT-IN)
		AVERAGE HEAT LOAD	897.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	15.4
HEAT PIPES	5.5
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	7.7
TOTAL	31.5

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	166.	16804.806 (IN),	.397 (IN)
FRAME NO., THICKNESS, HT.	5.	.114 (IN),	.570 (IN)
GRID BEAM THICKNESS	.170 (IN),	SPACING 4.781 (IN),	HEIGHT 2.391 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	114.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	22.1 (LBS)		
ADAPTER WEIGHT	68.1 (LBS)		

V1-136

MERCURY ORBITER/SEPS NL1-1-3

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	1	10.0	.1	4.0
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	RATE INTEGR GYRO	1	9.6	.2	32.0
1803	EARTH SENSOR	1	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	20.0	3.2	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMHD DECOD+DISTR	1	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
354	TRANSMITTER	3	2.8	.0	90.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0

VI-137

MERCURY ORBITER/SEPS NL1-1-3

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHG REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	7	2.3	.0	0.0
236	BATTERY	2	31.5	.3	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	8.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	150.0
STABILITY AND CONTROL	43.3
AUXILIARY PROPULSION	101.6
DATA PROCESSING	19.9
COMMUNICATIONS	29.1
BATTERIES	63.0
POWER CONTROL	52.2
CONVERTERS	10.0
SOLAR ARRAY	41.9
HARNESS	42.1
STRUCTURE	157.9
SOLAR ARRAY DRIVE	6.9
THERMAL CONTROL	31.5
DRY WEIGHT	749.4
PROPELLANT	242.9
SATELLITE ADAPTER	68.1
AKM	800.0

TOTAL LAUNCH WEIGHT 1860.4

✓ 1-138

SATURN-URANUS PROBE NL1-1-4

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STARILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = 1.300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONO PROPELLANT
TOTAL IMPULSE = 30800.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 219.44 WATTS
TOTAL SOLAR ARRAY AREA 65.43 SQ FT
INSTALLED BATTERY CAPACITY 18.00 AMP-HR
BEGINNING OF LIFE POWER 302.64 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE HEIGHT = 778.9 LBS (353.3 KG)

DIMENSIONS
EQUIPMENT BAY 42.4 IN.(1.08 M)
MISSION EQUIPMENT 13.9 IN.(.35 M)
TOTAL SATELLITE 56.3 IN.(1.43 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =
X-CG

LAUNCH WEIGHT =

808.5 LBS (366.8 KG)

HEIGHT
70.7 IN.(1.80 M)
23.1 IN.(.59 M)
70.7 IN.(1.80 M)
23.1 IN.(.59 M)

118.4 IYY = 485040.5

IZZ = 485040.5

Y-CG
0.0 IN.(0.00 M)
Z-CG
0.0 IN.(0.00 M)

CENTER OF GRAVITY 27.5 IN.(.70 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 28.5

MISSION LIFETIME 85.0(MO)

MEAN MISSION DURATION 70.7(MO)

RELIABILITY .509

V1-139

SATURN-URANUS PROBE NL1-1-4

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413
EQUIPMENT QUANTITIES 1 2 1 2 3 1
WEIGHT 39.54 LBS VOLUME 1.62(FT**3)
RELIABILITY .9533
IERR 0

POWER REQUIREMENT 9.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONO PROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 2 1 3
WEIGHT 279.33 LBS VOLUME 7.89(FT**3)
DRY WEIGHT 94.63(LBS), EXPENDABLE WEIGHT
RELIABILITY .8081
IERR 1

521 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
184.70(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9532
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 398 401 503 203
EQUIPMENT QUANTITIES 1 2 1 3 1
WEIGHT 53.42 LBS VOLUME 2.78(FT**3)
RELIABILITY .9217
IERR*****

POWER REQUIREMENT 77.2 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 213 303 1202
EQUIPMENT QUANTITIES 5 2 3 1
WEIGHT 77.36 LBS VOLUME 1.34(FT**3)
HARNESS WEIGHT 41.1(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .8350

POWER DISSIPATION 20.6 WATTS
32.2(LBS)

MISSION EQUIPMENT

WEIGHT 85.100 LBS VOLUME 3.37(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 46.0 WATTS

041-1A

SATURN-URANUS PPONE NL1-1-4

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	4.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	238.2 (BTU/HR),	TOTAL RADIATOR AREA	5.5 (FT**2)
HEAT PIPE	6086.4 (WATT-IN),	BATTERY HEATER POWER	113.9 (BTU/HR)
HEAT PIPE LENGTH	3.5 (FT)	TOTAL HEATER POWER	352.2 (BTU/HR)
STORED ENERGY	80.4 (BTU)	VARIABLE CONDUCTANCE H.P.	728.3 (WATT-IN)
		AVERAGE HEAT LOAD	491.6 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	12.7
HEAT PIPES	3.7
PHASE CHANGE MATERIAL	2.0
RADIATOR (PASSIVE)	2.7
TOTAL	21.1

IERP 1100010111

STRUCTURES

SKIN THICKNESS	.013 (IN)		
STRINGER NO. THICKNESS, HT.	217.	81910.347 (IN),	.344 (IN)
FRAME NO. THICKNESS, HT.	5.	.099 (IN),	.494 (IN)
GRID BEAM THICKNESS	.112 (IN),	SPACING 3.164 (IN),	HEIGHT 1.582 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	129.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	29.6 (LBS)		

VI-1-1

SATURN-URANUS PROBE NL1-1-4

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
803	EARTH SENSOR	3	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
409	PRESSURE REGULATOR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	3	10.2	1.3	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
398	XTRR	2	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
203	ANTENNA	1	10.4	.1	0.0

VI-142

SATURN-URANUS PROBE NL1-1-4

***** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	5	4.2	.1	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	3	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	85.0
STABILITY AND CONTROL	23.6
AUXILIARY PROPULSION	94.6
DATA PROCESSING	21.2
COMMUNICATIONS	53.4
BATTERIES	34.4
POWER CONTROL	42.9
CONVERTERS	15.9
SOLAR ARRAY	32.2
HARNESS	41.1
STRUCTURE	128.8
THERMAL CONTROL	21.1
DRY WEIGHT	594.2
PROPELLANT	184.7
SATELLITE ADAPTER	29.6

TOTAL LAUNCH WEIGHT 808.6

VI-143

DUAL COMET FLYBY NL1-1-5

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .250000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 11535. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CPT TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
4.
.1250
64.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 744.46 WATTS
TOTAL SOLAR ARRAY AREA 84.17 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 1071.69 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1101.5 LBS (499.7 KG)

LAUNCH WEIGHT = 1143.1 LBS (518.5 KG)

DIMENSIONS LENGTH

HEIGHT

WIDTH

EQUIPMENT BAY 36.2 IN. (.92 M)

60.3 IN. (1.53 M)

60.3 IN. (1.53 M)

MISSION EQUIPMENT 22.0 IN. (.56 M)

36.7 IN. (.93 M)

36.7 IN. (.93 M)

TOTAL SATELLITE 58.2 IN. (1.48 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

196.3 IYY = 537051.1

IZZ = 987066.9

CENTER OF GRAVITY 30.1 IN. (.77 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323.1/19323.1 28.5

MISSION LIFETIME 36.0 (MO)

MEAN MISSION DURATION 31.1 (MO)

RELIABILITY .701

44-144

DUAL COMET FLYBY NL1-1-5

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 1

WEIGHT 37.90 LBS VOLUME 1.18 (FT**3)

RELIABILITY .9550

ERR 10

POWER REQUIREMENT

78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1116 503 701 1203 603

EQUIPMENT QUANTITIES 12 4 5 9 2 1 1 1 2 1 1

WEIGHT 125.44 LBS VOLUME 4.90 (FT**3)

DRY WEIGHT 60.33 (LBS), EXPENDABLE WEIGHT

RELIABILITY .9545

ERR 0

POWER REQUIREMENT

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 1 1 1

WEIGHT 30.11 LBS VOLUME .54 (FT**3)

RELIABILITY .9700

ERR 2

POWER REQUIREMENT

13.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 618 203 398

EQUIPMENT QUANTITIES 1 1 2 1 2 1 1 2

WEIGHT 60.42 LBS VOLUME 2.87 (FT**3)

RELIABILITY .9557

ERR *****

POWER REQUIREMENT

147.7 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 515 269 650 702

EQUIPMENT QUANTITIES 2 9 2 2 1

WEIGHT 224.69 LBS VOLUME 2.73 (FT**3)

HARNESS WEIGHT 51.7 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9215

POWER DISSIPATION

125.1 WATTS

MISSION EQUIPMENT

WEIGHT 340.00 LBS VOLUME 13.45 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT

300.0 WATTS

VI-145

DUAL COMET FLYBY NL1-1-5

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	33.7 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1238.7 (BTU/HR),	TOTAL RADIATOR AREA	34.6 (FT**2)
HEAT PIPE	23580.1 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.6 (FT)	TOTAL HEATER POWER	1326.7 (BTU/HR)
STORED ENERGY	141.4 (BTU)	VARIABLE CONDUCTANCE H.P.	589.2 (WATT-IN)
		AVERAGE HEAT LOAD	1842.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	11.7
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	3.5
RADIATOR (PASSIVE)	21.4
TOTAL	40.4

IERR 11C0110111

STRUCTURES			
SKIN THICKNESS	.015 (IN)		
STRINGER NO., THICKNESS, HT.	185.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.344 (IN)
GRID BEAM THICKNESS	.132 (IN),	.099 (IN),	.495 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	SPACING 3.724 (IN),	HEIGHT 1.862 (IN)
EQUIPMENT BAY STRUCTURE WT.	97.12 (LBS)	CENTER 0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	24.9 (LBS)		
ADAPTER WEIGHT	41.6 (LBS)		

971-11

DUAL COMET FLYBY NL1-1-5

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1615	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XT. PR	2	12.1	1.2	70.0

VI-147

DUAL COMET FLYBY NL1-1-5

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	340.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	60.3
DATA PROCESSING	30.1
COMMUNICATIONS	60.4
BATTERIES	142.6
POWER CONTROL	82.1
SOLAR ARRAY	58.6
HARNESS	51.7
STRUCTURE	122.6
SOLAR ARRAY DRIVE	9.7
THERMAL CONTROL	40.4
DPY WEIGHT	1036.4
PROPELLANT	65.1
SATELLITE ADAPTER	41.6

TOTAL LAUNCH WEIGHT 1143.1

871-1A

SATURN ORB/TITAN LANDER NL1-1-6

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
 POINTING ACCURACY = .300000 (DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 28901. (LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
 64.
 16.
 8.
 4.
 .1250
 64.

MISSION EQUIPMENT DATA

0.
 128.
 100.
 8.
 2.
 1.00
 64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- RTG POWER GENERATION
 POWER REQUIREMENT 615.34 WATTS
 INSTALLED BATTERY CAPACITY 0.00 AMP-HR
 BEGINNING OF LIFE POWER 1274.69 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 4442.6 LBS (2015.1 KG)

LAUNCH WEIGHT = 4620.7 LBS (2095.9 KG)

DIMENSIONS

EQUIPMENT BAY 88.0 IN. (2.23 M)
 MISSION EQUIPMENT 41.6 IN. (1.06 M)
 TOTAL SATELLITE 129.6 IN. (3.29 M)

LENGTH
 120.0 IN. (3.05 M)
 69.3 IN. (1.76 M)

HEIGHT
 120.0 IN. (3.05 M)
 69.3 IN. (1.76 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

1433.0 IYY = 7700067.8

IZZ = 7700067.8

CENTER OF GRAVITY 81.5 IN. (2.07 M)

Y-CG 0.0 IN. (0.00 M)

Z-CG 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 28.5
 MISSION LIFETIME 80.0 (MO)
 MEAN MISSION DURATION 65.10 (MO)
 RELIABILITY .9519

VI-149

SATURN ORB/TITAN LANDER NL1-1-6

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 1

WEIGHT 37.90 LBS VOLUME 1.18(FT**3)

RELIABILITY .8927

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1127

EQUIPMENT QUANTITIES 12 4 5 9 2 1 1

WEIGHT 233.92 LBS VOLUME 6.63(FT**3)

DRY WEIGHT 69.71(LBS), EXPENDABLE WEIGHT

RELIABILITY .7736

IERR 11

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
164.22(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 1 1 1

WEIGHT 30.11 LBS VOLUME .54(FT**3)

RELIABILITY .9346

IERR 2

POWER REQUIREMENT 13.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 618 203

EQUIPMENT QUANTITIES 1 1 2 1 3 1 1

WEIGHT 61.92 LBS VOLUME 2.89(FT**3)

RELIABILITY .8931

IERR*****

398 2
POWER REQUIREMENT 147.7 WATTS

ELECTRICAL POWER

CONFIGURATION - - RTG POWER GENERATION

EQUIPMENT CODE IDENTIFIER ****

EQUIPMENT QUANTITIES 0

WEIGHT 525.00 LBS VOLUME 105.00(FT**3)

HARNESS WEIGHT 381.9(LBS), RTG WEIGHT

RELIABILITY 1.5330

POWER DISSIPATION 0.0 WATTS
525.0(LBS)

MISSION EQUIPMENT

WEIGHT 2300.00 LBS VOLUME 90.84(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 170.0 WATTS

VI-150

SATURN ORB/TITAN LANDER NL1-1-6

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	24.5 (FT**2),	NUCLEAR POWER RADIATOR AREA	17.8 (FT**2)
HEATER POWER	800.6 (BTU/HR),	TOTAL RADIATOR AREA	42.3 (FT**2)
HEAT PIPE	39870.4 (WATT-IN),	BATTERY HEATER POWER	0.0 (BTU/HR)
HEAT PIPE LENGTH	8.1 (FT)	TOTAL HEATER POWER	800.6 (BTU/HR)
STORED ENERGY	142.8 (BTU)	VARIABLE CONDUCTANCE H.P.	0.0 (WATT-IN)
		AVERAGE HEAT LOAD	1399.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	37.9
HEAT PIPES	8.5
PHASE CHANGE MATERIAL	3.6
RADIATOR (PASSIVE)	15.5
TOTAL	65.5

IERR 1100110111

STRUCTURES				
SKIN THICKNESS	.030 (IN)			
STRINGER NO., THICKNESS, HT.	183.		81910.347 (IN),	.691 (IN)
FRAME NO., THICKNESS, HT.	6.		.198 (IN),	.992 (IN)
GRID BEAM THICKNESS	.253 (IN),	SPACING	7.117 (IN),	HEIGHT 3.558 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	9.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	251.13 (LBS)			
SOLAR ARRAY BOOM AND CRIVE WT.	15.2 (LBS)			
ADAPTER WEIGHT	178.1 (LBS)			

VI-151

SATURN ORB/TITAN LANDER NL1-1-6

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	FEACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1127	TANK	1	16.7	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMD SIG COND	3	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	2	12.1	1.2	70.0

VI-152

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	2300.0 *
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	69.7
DATA PROCESSING	30.1
COMMUNICATIONS	61.9
BATTERIES	0.0
NUCLEAR POWER UNIT	525.0
HARNES	381.9
STRUCTURE	806.3
THERMAL CONTROL	65.5
DRY WEIGHT	4278.4
PROPELLANT	164.2
SATELLITE ADAPTER	178.1

TOTAL LAUNCH WEIGHT 4620.7

* Incl. retrorocket wt (1300#)

VI-153

MARS POLAR ORBITER NL1-1-7

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION - - THREE AXIS MASS EXPULSION
 POINTING ACCURACY = .300000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION - - MONOPROPELLANT
 TOTAL IMPULSE = 151855. (LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

64.
 64.
 100.
 13.
 5.
 1.0000
 64.

MISSION EQUIPMENT DATA

0.
 0.
 0.
 0.
 0.
 0.0000
 0.

COMMUNICATIONS
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 128.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 582.76 WATTS
 TOTAL SOLAR ARRAY AREA 72.43 SQ FT
 INSTALLED BATTERY CAPACITY 34.00 AMP-HR
 BEGINNING OF LIFE POWER 892.10 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 2829.5 LBS (1283.4 KG)

LAUNCH WEIGHT = 2931.5 LBS (1329.7 KG)

DIMENSIONS

EQUIPMENT BAY 49.1 IN. (1.25 M)

81.8 IN. (2.08 M)

81.8 IN. (2.08 M)

MISSION EQUIPMENT 26.6 IN. (.68 M)

44.3 IN. (1.13 M)

44.3 IN. (1.13 M)

TOTAL SATELLITE 75.7 IN. (1.92 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

618.9 IYY = 2363842.1

IZZ = 2803556.1

CENTER OF GRAVITY 34.8 IN. (.88 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

LIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 5000. / 5000. / 28.5

MISSION LIFETIME 36.0 (MO)

MEAN MISSION DURATION 32.8 (MO)

RELIABILITY .754

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MARS POLAR ORBITER NL1-1-7

***** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1*****

STABILIZATION AND CONTROL

CONFIGURATION - - THREE AXIS MASS EXPULSION

EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803

EQUIPMENT QUANTITIES 2 2 1 2 2
WEIGHT 87.50 LBS VOLUME 1.71 (FT**3)
RELIABILITY .9786
IERR 0

POWER REQUIREMENT 56.0 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118

EQUIPMENT QUANTITIES 6 2 5 9 2 1 11

WEIGHT 1357.59 LBS VOLUME 26.22 (FT**3)

DRY WEIGHT 427.15 (LBS), EXPENDABLE WEIGHT

RELIABILITY .8908

IERR 11

536 701 1203 603
2 2 1 1
POWER REQUIREMENT 1.0 WATTS
930.44 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 406

EQUIPMENT QUANTITIES 1 2
WEIGHT 30.93 LBS VOLUME .40 (FT**3)
RELIABILITY .9891
IERR 1

POWER REQUIREMENT 8.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 203 103 354 401 503 618

EQUIPMENT QUANTITIES 1 1 4 2 3 2

WEIGHT 38.74 LBS VOLUME .44 (FT**3)

RELIABILITY .9859

IERR*****

POWER REQUIREMENT 97.7 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 112 233 315 1202

EQUIPMENT QUANTITIES 10 2 3 1

WEIGHT 129.41 LBS VOLUME 1.74 (FT**3)

HARNESS WEIGHT 174.0 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9859

POWER DISSIPATION 141.6 WATTS
50.4 (LBS)

MISSION EQUIPMENT

WEIGHT 600.100 LBS VOLUME 23.73 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT 80.0 WATTS

V1-155

(3)

MARS POLAR ORBITER NL1-1-7

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	11.3 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	926.3(BTU/HR),	TOTAL RADIATOR AREA	12.5 (FT**2)
HEAT PIPE	13900.8(WATT-IN),	BATTERY HEATER POWER	115.0(BTU/HR)
HEAT PIPE LENGTH	4.7 (FT)	TOTAL HEATER POWER	941.3(BTU/HR)
STORED ENERGY	125.5 (BTU)	VARIABLE CONDUCTANCE H.P.	978.9(WATT-IN)
		AVERAGE HEAT LOAD	829.3 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	17.5
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	7.2

TOTAL	32.8

IERR 1100010111

STRUCTURES					
SKIN THICKNESS	.025 (IN)				
STRINGER NO., THICKNESS, HT.	168. ,	16804.806 (IN),		.514 (IN)	
FRAME NO., THICKNESS, HT.	5. ,	.147 (IN),		.737 (IN)	
GRID BEAM THICKNESS	.217 (IN),	SPACING 6.104 (IN),	HEIGHT 3.052 (IN)		
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	331.1 (LBS)				
SOLAR ARRAY BOOM AND DRIVE WT.	23.6 (LBS)				
ADAPTER WEIGHT	102.0 (LBS)				

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MARS POLAR ORBITER NL1-1-7

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	RATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	2	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	11	10.2	1.3	0.0
536	TANK	2	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMO DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
354	TRANSMITTER	4	1.8	.0	90.0
401	RECEIVER	2	1.9	.1	6.3
503	COMMAND SIG COND	3	.5	.0	.9
618	DIPLEXER	2	.5	.0	0.0

VI-157

MARS POLAR ORBITER NL1-1-7

* * * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	N ^o	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	10	1.4	.0	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	3	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	77.5
AUXILIARY PROPULSION	427.2
DATA PROCESSING	30.9
COMMUNICATIONS	38.7
BATTERIES	68.3
POWER CONTROL	61.1
CONVERTERS	10.0
SOLAR ARRAY	50.4
HARNESS	174.0
STRUCTURE	319.8
SOLAR ARRAY DRIVE	8.4
THERMAL CONTROL	32.8
DRY WEIGHT	1899.0
PROPELLANT	930.4
SATELLITE ADAPTER	102.0

TOTAL LAUNCH WEIGHT 2931.5

✓ 1-158

F/O JUPITER(SEPS) NL1-1-8

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 153137. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
3.	2.
1.0000	1.0000
32.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- RTG POWER GENERATION
POWER REQUIREMENT 558.30 WATTS
INSTALLED BATTERY CAPACITY 0.00 AMP-HR
BEGINNING OF LIFE POWER 821.05 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 2595.3 LBS (1177.2 KG) LAUNCH WEIGHT = 2697.4 LBS (1223.5 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	73.6 IN. (1.87 M)	120.0 IN. (3.05 M)	120.0 IN. (3.05 M)	
MISSION EQUIPMENT	16.8 IN. (.43 M)	27.9 IN. (.71 M)	27.9 IN. (.71 M)	
TOTAL SATELLITE	90.3 IN. (2.29 M)			

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 1008.6 IYY = 3545744.4 IZZ = 3545744.4

CENTER OF GRAVITY		X-CG	Y-CG	Z-CG
42.1 IN. (1.07 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)	

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 19323.1/19323.7 28.5
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 32.9 (MO)
RELIABILITY .753

VI-159

F/O JUPITER(SEPS) NL1-1-8

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 3 2 2 2

WEIGHT 60.00 LBS VOLUME 1.93(FT**3)

RELIABILITY .9964

IERR

10

POWER REQUIREMENT

78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130

EQUIPMENT QUANTITIES 18 10 5 9 2 1 5

WEIGHT 1044.21 LBS VOLUME 21.22(FT**3)

DRY WEIGHT 179.91(LBS), EXPENDABLE WEIGHT

RELIABILITY .8610

IERR

1

527 701 1203 603

1 2 1 1

POWER REQUIREMENT

.3 WATTS

364.29(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 2 2 2

WEIGHT 60.22 LBS VOLUME

RELIABILITY .9997

IERR

2

1.09(FT**3)

POWER REQUIREMENT

13.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 618 203

EQUIPMENT QUANTITIES 1 2 2 2 3 2 1

WEIGHT 69.34 LBS VOLUME 3.00(FT**3)

RELIABILITY .9759

IERR*****

398

2

POWER REQUIREMENT

17.66 WATTS

ELECTRICAL POWER

CONFIGURATION - - RTG POWER GENERATION

EQUIPMENT CODE IDENTIFIER ***

EQUIPMENT QUANTITIES 0

WEIGHT 350.00 LBS VOLUME

HARNESS WEIGHT 203.7(LBS),

RELIABILITY 1.5330

70.00(FT**3)

RTG WEIGHT

POWER DISSIPATION

0.0 WATTS

350.0(LBS)

MISSION EQUIPMENT

WEIGHT 150.00 LBS VOLUME

RELIABILITY .9000

5.94(FT**3)

POWER REQUIREMENT

75.0 WATTS

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F/O JUPITER(SEPS) NL1-1-8

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	18.8 (FT**2),	NUCLEAR POWER RADIATOR AREA	12.1 (FT**2)	
HEATER POWER	515.8(BTU/HR),	TOTAL RADIATOR AREA	31.0 (FT**2)	
HEAT PIPE	21362.5(WATT-IN),	BATTERY HEATER POWER	0.0(BTU/HR)	
HEAT PIPE LENGTH	5.6 (FT)	TOTAL HEATER POWER	515.8(BTU/HR)	
STORED ENERGY	132.9 (BTU)	VARIABLE CONDUCTANCE H.P.	0.0(WATT-IN)	
		AVERAGE HEAT LOAD	1075.2 (BTU/HR)	

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	27.6
HEAT PIPES	5.9
PHASE CHANGE MATERIAL	3.3
RADIATOR (PASSIVE)	11.9
TOTAL	48.8

IERR 1100110111

STRUCTURES				
SKIN THICKNESS	.023 (IN)			
STRINGER NO., THICKNESS, HT.	212. ,	81910.347 (IN),	.597 (IN)	
FRAME NO., THICKNESS, HT.	5.1	.171 (IN),	.857 (IN)	
GRID BEAM THICKNESS	.199 (IN),	SPACING 5.593 (IN),	HEIGHT 2.796 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	432.2 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	102.11 (LBS)			

✓1-161

F/O JUPITER(SEPS) NL1-1-8

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	10	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	5	17.3	3.2	0.0
527	TANK	1	30.0	1.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMMD DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	2	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	2	12.1	1.2	70.0

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F/O JUPITER(SEPS) NL1-1-8

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	150.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	179.9
DATA PROCESSING	60.2
COMMUNICATIONS	69.3
BATTERIES	0.0
NUCLEAR POWER UNIT	350.0
HARNES	203.7
STRUCTURE	609.0
THERMAL CONTROL	48.6
DRY WEIGHT	1731.0
PROPELLANT	864.3
SATELLITE ADAPTER	102.1

TOTAL LAUNCH WEIGHT	2697.4

V1-163

MARS SURFACE SAMPLE RETURN NL1-1-12

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	21.5 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	1813.1 (BTU/HR),	TOTAL RADIATOR AREA	22.0 (FT**2)
HEAT PIPE	35918.3 (WATT-IN),	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	6.5 (FT)	TOTAL HEATER POWER	1846.5 (BTU/HR)
STORIED ENERGY	126.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1046.8 (WATT-IN)
		AVERAGE HEAT LOAD	1579.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	27.1
HEAT PIPES	6.8
PHASE CHANGE MATERIAL	3.2
RADIATOR (PASSIVE)	13.6
TOTAL	50.6

IERR 1100010111

STRUCTURES					
SKIN THICKNESS	.039 (IN)				
STRINGER NO., THICKNESS, HT.	150.		16804.806 (IN),		.719 (IN)
FRAME NO., THICKNESS, HT.	5.		.207 (IN),		1.033 (IN)
GRID BEAM THICKNESS	.1340 (IN),	SPACING	9.582 (IN),	HEIGHT	4.791 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	670.9 (LBS)				
SOLAR ARRAY BOOM AND DRIVE WT.	30.1 (LBS)				
ADAPTER WEIGHT	226.8 (LBS)				

491-164

MARS SURFACE SAMPLE RETURN NL1-1-12

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
1413	POWER CONVERTER	2	15.9	.4	0.0
1710	RATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	3	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
507	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	2	6.0	.6	0.0
1130	TANK	12	20.0	3.2	0.0
536	TANK	2	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMM DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	2	10.4	.1	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
354	TRANSMITTER	5	2.8	.0	90.0
431	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	3	1.5	.0	0.0

VI-165

MARS SURFACE SAMPLE RETURN NL1-1-12

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
418	DISCHGE REGULATOR	3	24.0	.16	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
263	BATTERY	2	49.5	.4	0.0
650	BATTERY CHARGER	3	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.5	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	2380.0
STABILITY AND CONTROL	109.6
AUXILIARY PROPULSION	569.5
DATA PROCESSING	39.9
COMMUNICATIONS	53.9
BATTERIES	99.0
POWER CONTROL	145.9
CONVERTERS	10.0
SOLAR ARRAY	89.7
HARNESS	437.0
STRUCTURE	734.9
SOLAR ARRAY DRIVE	14.9
THERMAL CONTROL	50.6
DRY WEIGHT	4754.9
PROPELLANT	2300.6
SATELLITE ADAPTER	226.8

TOTAL LAUNCH WEIGHT 7282.3

721-1A

TERRESTRIAL BODIES ORB(LUNAR) NL2-1-1

* * * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 47809.(LB-SEC)

ATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.

64.

16.

8.

3.

1.0000

32.

0.

128.

100.

8.

2.

1.0000

64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 435.72 WATTS

TOTAL SOLAR ARRAY AREA 46.35 SQ FT

INSTALLED BATTERY CAPACITY 56.00 AMP-HR

BEGINNING OF LIFE POWER 590.13 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1754.1 LBS (795.7 KG)

LAUNCH WEIGHT = 1820.5 LBS (825.8 KG)

DIMENSIONS

EQUIPMENT BAY 38.8 IN.(.98 M)

MISSION EQUIPMENT 46.8 IN.(1.19 M)

TOTAL SATELLITE 85.6 IN.(2.17 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

231.4 IYY = 1428423.0

IZZ = 1606948.0

CENTER OF GRAVITY 15.9 IN.(.40 M)

X-CG 0.0 IN.(0.00 M)

Y-CG 0.0 IN.(0.00 M)

Z-CG

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 28.5

MISSION LIFETIME 24.0(MO)

MEAN MISSION DURATION 20.4(MO)

RELIABILITY .656

VI-167

TERRESTRIAL BODIES ORB(LUNAR) NL2-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 1 1 1

WEIGHT 30.80 LBS VOLUME 1.04(FT**3)

RELIABILITY .9335

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 1 1 2

WEIGHT 370.24 LBS VOLUME 12.05(FT**3)

DRY WEIGHT 103.41(LBS), EXPENDABLE WEIGHT

RELIABILITY .9002

IERR 1

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
269.83(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 1 1 1

WEIGHT 30.11 LBS VOLUME .54(FT**3)

RELIABILITY .9799

IERR 2

POWER REQUIREMENT 13.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 518 203 398

EQUIPMENT QUANTITIES 1 1 2 1 2 1 1 1

WEIGHT 48.32 LBS VOLUME 1.56(FT**3)

RELIABILITY .9247

IERR*****

POWER REQUIREMENT 147.7 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 254 609 702

EQUIPMENT QUANTITIES 2 5 2 2 1

WEIGHT 138.67 LBS VOLUME 1.75(FT**3)

HARNESS WEIGHT 49.0(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9568

POWER DISSIPATION 73.6 WATTS
32.3(LBS)

MISSION EQUIPMENT

WEIGHT 300.00 LBS VOLUME 33.39(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 123.0 WATTS

891-168

TERRESTRIAL BODIES ORB(LUNAR) NL2-1-1

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	1	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	5.0	.6	0.0
1130	TANK	2	20.0	3.2	0.0
509	TANK	1	15.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	1	12.1	1.2	0.0

VI-169

ENS C01-1-1

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*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = 0.400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 21656.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
4.	2.
1250	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 599.72 WATTS
TOTAL SOLAR ARRAY AREA 130.35 SQ FT
INSTALLED BATTERY CAPACITY 40.00 AMP-HR
BEGINNING OF LIFE POWER 1605.59 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 1464.1 LBS (664.1 KG) LAUNCH WEIGHT = 1520.3 LBS (689.6 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 37.9 IN.(.96 M) 63.2 IN.(1.61 M) 63.2 IN.(1.61 M)
MISSION EQUIPMENT 26.5 IN.(.67 M) 44.2 IN.(1.12 M) 44.2 IN.(1.12 M)
TOTAL SATELLITE 64.4 IN.(1.64 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 370.4 IYY = 818647.8 IZZ = 1881852.7
X-CG Y-CG Z-CG
CENTER OF GRAVITY 35.2 IN.(.89 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 427./ 427./ 82.0
MISSION LIFETIME 36.0(MO)
MEAN MISSION DURATION 31.5(MO)
RELIABILITY .701

VI-171

EMS COL-1-1

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 1

WEIGHT 37.90 LBS VOLUME 1.18(FT**3)

RELIABILITY .9550

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 90

EQUIPMENT QUANTITIES 18 4 5 9 2

WEIGHT 185.70 LBS VOLUME 6.38(FT**3)

DRY WEIGHT 63.48(LBS), EXPENDABLE WEIGHT

RELIABILITY .9656

IERR 0

POWER REQUIREMENT .3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 4 1

WEIGHT 97.31 LBS VOLUME 2.04(FT**3)

RELIABILITY .9047

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312

EQUIPMENT QUANTITIES 2 1 2 1 3 1 2 2

WEIGHT 25.12 LBS VOLUME .30(FT**3)

RELIABILITY .9838

IERR*****

POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 531 239 609 702

EQUIPMENT QUANTITIES 2 8 2 3 1

WEIGHT 162.70 LBS VOLUME 4.19(FT**3)

HARNESS WEIGHT 74.0(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9488

POWER DISSIPATION 774.8 WATTS

90.8(LBS)

MISSION EQUIPMENT

WEIGHT 594.00 LBS VOLUME 23.49(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 280.0 WATTS

41-172

ENS C01-1-1

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	20.6 (FT**2)	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	1984.3 (BTU/HR)	TOTAL RADIATOR AREA	21.7 (FT**2)
HEAT PIPE	22132.9 (WATT-IN)	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	2081.2 (BTU/HR)
STORED ENERGY	106.7 (BTU)	VARIABLE CONDUCTANCE-H.P.	652.4 (WATT-IN)
		AVERAGE HEAT LOAD	1561.8 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	12.9
HEAT PIPES	4.2
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	13.0
TOTAL	32.8

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.012 (IN)		
STRINGER NO., THICKNESS, HT.	176.	3888.588 (IN)	.379 (IN)
FRAME NO., THICKNESS, HT.	5.	.109 (IN)	.544 (IN)
GRID BEAM THICKNESS	.153 (IN)	SPACING 4.300 (IN)	HEIGHT 2.150 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN)	CENTER 0.000 (IN)	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	103.3 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	30.3 (LBS)		
ADAPTER WEIGHT	56.2 (LBS)		

V1-173

EMS C01-1-1

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
511	TANK	1	11.5	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMHD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
903	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-174

EMS C01-1-1

♦ ♦ ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHG REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	8	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

IGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	594.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	63.5
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	95.4
SOLAR ARRAY	90.8
HARNESS	74.0
STRUCTURE	148.7
SOLAR ARRAY DRIVE	15.1
THERMAL CONTROL	32.8
DRY WEIGHT	1341.9
PROPELLANT	122.2
SATELLITE ADAPTER	56.2

TOTAL LAUNCH WEIGHT 1520.3

VI-175

GOES C01-1-2

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 28187.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
32.	128.
10.	100.
8.	8.
3.	2.
1250	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 329.08 WATTS
TOTAL SOLAR ARRAY AREA 136.88 SQ FT
INSTALLED BATTERY CAPACITY 28.00 AMP-HR
BEGINNING OF LIFE POWER 442.78 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1315.6 LBS (596.8 KG)		LAUNCH WEIGHT = 1372.4 LBS (622.5 KG)	
DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	61.4 IN.(1.56 M)	102.3 IN.(2.60 M)	102.3 IN.(2.60 M)
MISSION EQUIPMENT	19.8 IN.(.50 M)	33.0 IN.(.84 M)	33.0 IN.(.84 M)
TOTAL SATELLITE	81.1 IN.(2.06 M)		
MOMENTS OF INERTIA (SLUGS*FT**2)	IXX = 356.3	IYY = 1600963.9	IZZ = 1600963.9
	X-CG	Y-CG	Z-CG

CENTER OF GRAVITY	43.3 IN.(1.10 M)	0.0 IN.(0.00 M)	0.0 IN.(0.00 M)
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RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.5(MO)
RELIABILITY .600

VI-176

GOES CO1-1-2

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 2 2 2 2 1
WEIGHT 46.60 LBS VOLUME 2.10(FT**3)
RELIABILITY .9710
IERR 0

POWER REQUIREMENT - - 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 2 1 2
WEIGHT 248.83 LBS VOLUME 6.25(FT**3)
DRY WEIGHT 79.39(LBS), EXPENDABLE WEIGHT
RELIABILITY .9457
IERR 11

521 701 1203 603
1 2 1 1
POWER REQUIREMENT - - 1.0 WATTS
169.44(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 4 1
WEIGHT 97.31 LBS VOLUME 2.04(FT**3)
RELIABILITY .7590
IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202
EQUIPMENT QUANTITIES 1 2 2 2 3 2 1
WEIGHT 47.94 LBS VOLUME 1.82(FT**3)
RELIABILITY .9921
IERR*****

312
2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 224 306 1202
EQUIPMENT QUANTITIES 8 2 2 1
WEIGHT 128.99 LBS VOLUME 2.21(FT**3)
HARNESS WEIGHT 80.3(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9644

POWER DISSIPATION 26.2 WATTS
67.3(LBS)

MISSION EQUIPMENT

WEIGHT 247.00 LBS VOLUME 9.78(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 128.0 WATTS

VI-177

GOES COL-1-2

* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	7.0 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	661.7 (BTU/HR),	TOTAL RADIATOR AREA	8.1 (FT**2)
HEAT PIPE	14504.8 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.1 (FT)	TOTAL HEATER POWER	776.7 (BTU/HR)
STORED ENERGY	85.9 (BTU)	VARIABLE CONDUCTANCE H.P.	1049.8 (WATT-IN)
		AVERAGE HEAT LOAD	812.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	22.1
HEAT PIPES	5.3
PHASE CHANGE MATERIAL	2.1
RADIATOR (PASSIVE)	4.4
TOTAL	34.0

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.015 (IN)			
STRINGER NO., THICKNESS, HT.	236.		81910.347 (IN),	.456 (IN)
FRAME NO., THICKNESS, HT.	5.		.131 (IN),	.654 (IN)
GRID BEAM THICKNESS	.137 (IN),	SPACING	3.846 (IN),	HEIGHT 1.923 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	156.3 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	56.8 (LBS)			

71-178

GOES CD1-1-2

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	NUTATION DAMPER	2	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	2	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-179

GOES C01-1-2

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	247.0
STABILITY AND CONTROL	30.7
AUXILIARY PROPULSION	79.4
DATA PROCESSING	97.3
COMMUNICATIONS	47.9
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	67.3
HARNESS	80.3
STRUCTURE	317.4
THERMAL CONTROL	34.0
DRY WEIGHT	1146.2
PROPELLANT	169.4
SATELLITE ADAPTER	56.8

TOTAL LAUNCH WEIGHT 1372.4

081-1A

GOES F/O COI-1-23

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .500000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 28187.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA .. MISSION EQUIPMENT DATA

32.	0.
32.	128.
10.	100.
8.	8.
3.	2.
.1250	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 433.08 WATTS
TOTAL SOLAR ARRAY AREA 180.14 SQ FT
INSTALLED BATTERY CAPACITY 36.00 AMP-HR
BEGINNING OF LIFE POWER 582.71 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1757.8 LBS (797.3 KG) LAUNCH WEIGHT = 1837.3 LBS (833.4 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	70.4 IN. (1.79 M)	117.3 IN. (2.98 M)	117.3 IN. (2.98 M)	
MISSION EQUIPMENT	24.2 IN. (.61 M)	40.3 IN. (1.02 M)	40.3 IN. (1.02 M)	
TOTAL SATELLITE	94.5 IN. (2.40 M)			

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 583.5 IYY = 2720836.0 IZZ = 2720836.0

X-CG		Y-CG	Z-CG
CENTER OF GRAVITY	53.9 IN. (1.37 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.5(MO)
RELIABILITY .600

18-18

GOES F/O COI-1-23

♦ ♦ SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ♦ ♦ ♦ ♦

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 141
EQUIPMENT QUANTITIES 1 2 2 2 2 1
WEIGHT 46.60 LBS VOLUME 2.10(FT**3)
RELIABILITY .9710
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 2 1 2
WEIGHT 248.83 LBS VOLUME 6.25(FT**3)
DRY WEIGHT 79.39(LBS), EXPENDABLE WEIGHT
RELIABILITY .9464
IERR 11

521 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
169.44(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 4 1
WEIGHT 97.31 LBS VOLUME 2.04(FT**3)
RELIABILITY .7590
IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202
EQUIPMENT QUANTITIES 1 2 2 2 3 2 1
WEIGHT 47.94 LBS VOLUME 1.82(FT**3)
RELIABILITY .9921
IERR*****

312
2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 236 315 1202
EQUIPMENT QUANTITIES 10 2 3 1
WEIGHT 170.05 LBS VOLUME 3.29(FT**3)
HARNESS WEIGHT 103.2(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9638

POWER DISSIPATION 34.5 WATTS
88.5(LBS)

MISSION EQUIPMENT

WEIGHT 450.00 LBS VOLUME 17.80(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 232.0 WATTS

VI 182

GOES F/O CD1-1-23

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL
RADIATOR AREA

10.0 (FT**2),

HEATER POWER 966.7 (BTU/HR),

HEAT PIPE 24276.0 (WATT-IN),

HEAT PIPE LENGTH 5.9 (FT)

STORED ENERGY 85.9 (BTU)

BATTERY RADIATOR AREA

TOTAL RADIATOR AREA

BATTERY HEATER POWER

TOTAL HEATER POWER

VARIABLE CONDUCTANCE-H.P.-----

AVERAGE HEAT LOAD

1.2 (FT**2)

11.2 (FT**2)

115.0 (BTU/HR)

1081.7 (BTU/HR)

1223.2 (WATT-IN)

1167.4 (BTU/HR)

THERMAL CONTROL WEIGHT

INSULATION

HEAT PIPES

PHASE CHANGE MATERIAL

RADIATOR (PASSIVE)

UNIT WEIGHT (LBS)

28.2

6.2

2.1

6.3

TOTAL

42.9

IERR

1100010111

STRUCTURES

SKIN THICKNESS .017 (IN)

STRINGER NO., THICKNESS, HT.

FRAME NO., THICKNESS, HT.

GRID BEAM THICKNESS

ENDCOVER THICKNESS- FORWARD

EQUIPMENT BAY STRUCTURE WT.

SOLAR ARRAY BOOM AND DRIVE WT.

ADAPTER WEIGHT

239.

5.

.154 (IN)

.030 (IN)

167.5 (LBS)

0.0 (LBS)

79.5 (LBS)

81910.347 (IN),

.149 (IN),

SPACING 4.329 (IN),

CENTER 0.000 (IN),

AFT

.518 (IN)

.744 (IN)

HEIGHT 2.165 (IN)

.030 (IN)

88-183

GOES F/O .COL-1-2³

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	ROTATION DAMPER	2	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	2	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

781-1A

GOES F/O COI-1-~~2~~³

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
236	BATTERY	2	40.2	.4	0.0
315	BATTERY CHARGER	3	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	450.0
STABILITY AND CONTROL	30.7
AUXILIARY PROPULSION	79.4
DATA PROCESSING	97.3
COMMUNICATIONS	47.9
BATTERIES	80.5
POWER CONTROL	89.6
CONVERTERS	15.9
SOLAR ARRAY	88.5
HARNESS	103.2
STRUCTURE	462.4
THERMAL CONTROL	42.9
DRY WEIGHT	1588.4
PROPELLANT	169.4
SATELLITE ADAPTER	79.3

TOTAL LAUNCH WEIGHT 1837.3

V1-185

ALL WEATHER MICROWAVE COL-2-1

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 24242.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
4.
.1250
64.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 1278.18 WATTS
TOTAL SOLAR ARRAY AREA 292.72 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 3605.53 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 2554.3 LBS (1158.6 KG)

LAUNCH WEIGHT = 2647.0 LBS (1200.7 KG)

DIMENSIONS

EQUIPMENT BAY 39.6 IN.(1.01 M)
MISSION EQUIPMENT 33.4 IN.(.85 M)
TOTAL SATELLITE 73.0 IN.(1.85 M)

HEIGHT 66.0 IN.(1.68 M)
WIDTH 66.0 IN.(1.68 M)
55.6 IN.(1.41 M)
55.6 IN.(1.41 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

1651.9 IYY = 1611596.8 IZZ = 8097897.1

X-CG 40.7 IN.(1.04 M)

Y-CG 0.0 IN.(0.00 M)

Z-CG 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 427./ 427./ 82.0
MISSION LIFETIME 60.0(MD)
MEAN MISSION DURATION 49.3(MD)
RELIABILITY .605

981-1A

ALL WEATHER MICROWAVE COL-2-1

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 3 2 2 2

WEIGHT 60.00 LBS VOLUME 1.93(FT**3)

RELIABILITY .9903

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1127 507 701 1203 603

EQUIPMENT QUANTITIES 18 6 5 9 2 1 1 2 2 1 1

WEIGHT 208.87 LBS VOLUME 7.18(FT**3)

DRY WEIGHT 72.05(LBS), EXPENDABLE WEIGHT

RELIABILITY .9509

IERR 1

POWER REQUIREMENT .3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 3 1

WEIGHT 80.51 LBS VOLUME 1.67(FT**3)

RELIABILITY .9342

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312

EQUIPMENT QUANTITIES 2 1 2 2 3 1 2 2

WEIGHT 29.04 LBS VOLUME .35(FT**3)

RELIABILITY .9838

IERR*****

POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 424 532 269 650 702

EQUIPMENT QUANTITIES 2 10 2 2 2

WEIGHT 309.74 LBS VOLUME 4.89(FT**3)

HARNESS WEIGHT 125.8(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8739

POWER DISSIPATION 1021.5 WATTS

203.8(LBS)

MISSION EQUIPMENT

WEIGHT 1188.00 LBS VOLUME 46.95(FT**3)

RELIABILITY .8000

POWER REQUIREMENT 960.0 WATTS

VI-187

ALL WEATHER MICROWAVE__ C01-2-1

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	51.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	4934.7 (BTU/HR),	TOTAL RADIATOR AREA	52.1 (FT**2)
HEAT PIPE	62286.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.6 (FT)	TOTAL HEATER POWER	5024.7 (BTU/HR)
STORED ENERGY	117.1 (BTU)	VARIABLE CONDUCTANCE H.P.	738.9 (WATT-IN)
		AVERAGE HEAT LOAD	3880.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	14.5
HEAT PIPES	4.8
PHASE CHANGE MATERIAL	2.9
RADIATOR (ACTIVE)	93.2
TOTAL	115.4

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.023 (IN)			
STRINGER NO., THICKNESS, HT.	158.		3888.588 (IN),	.443 (IN)
FRAME NO., THICKNESS, HT.	5.		.127 (IN),	.636 (IN)
GRID BEAM THICKNESS	.200 (IN),	SPACING	5.621 (IN),	HEIGHT 2.811 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	139.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	49.0 (LBS)			
ADAPTER WEIGHT	92.7 (LBS)			

881-188

ALL WEATHER MICROWAVE .COL-2-1

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1127	TANK	1	16.7	3.2	0.0
507	TANK	2	6.7	.3	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMFAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-189

ALL WEATHER MICROWAVE COL-2-

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
424	DISCHGE REGULATOR	2	32.0	.8	0.0
532	SHUNT REGULATOR	10	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAM.	WEIGHT
MISSION EQUIPMENT	1188.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	72.0
DATA PROCESSING	80.5
COMMUNICATIONS	29.0
BATTERIES	142.6
POWER CONTROL	167.2
SOLAR ARRAY	203.8
HARNES	125.8
STRUCTURE	199.3
SOLAR ARRAY DRIVE	33.8
THERMAL CONTROL	115.4
DRY WEIGHT	2417.5
PROPELLANT	136.8
SATELLITE ADAPTER	92.7

TOTAL LAUNCH WEIGHT 2647.0

VI-190

OP SEASAT CO2-1-1

SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 17608. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.0 (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
3.	2.
1.0000	1.0000
32.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 1535.92 WATTS
TOTAL SOLAR ARRAY AREA 332.18 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 4091.66 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 3391.9 LBS (1538.5 KG)		LAUNCH WEIGHT = 3512.9 LBS (1593.4 KG)	
DIMENSIONS		DIMENSIONS	
LENGTH	HEIGHT	LENGTH	WIDTH
EQUIPMENT BAY 38.4 IN. (.98 M)	64.1 IN. (1.63 M)	64.1 IN. (1.63 M)	64.1 IN. (1.63 M)
MISSION EQUIPMENT 39.4 IN. (1.00 M)	65.6 IN. (1.67 M)	65.6 IN. (1.67 M)	65.6 IN. (1.67 M)
TOTAL SATELLITE 77.8 IN. (1.98 M)			
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 2203.4		IYY = 2141440.7 IZZ = 10881018.7	
X-CG		Y-CG	
CENTER OF GRAVITY 45.2 IN. (1.15 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)	0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION
MISSION LIFETIME
MEAN MISSION DURATION
RELIABILITY

440.1/ 440.7/108.0
36.0(MO)
31.5(MO)
.0711

VI-191

OP SEASAT CD2-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303			
EQUIPMENT QUANTITIES	2	2	2	2			
WEIGHT	58.40 LBS				VOLUME	1.77(FT**3)	POWER REQUIREMENT 78.9 WATTS
RELIABILITY		.9946					
IERR	10						

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	906	1003	499	203	1124	506	701	1203	603
EQUIPMENT QUANTITIES	18	4	5	9	2	1	1	1	2	1	1
WEIGHT	154.08 LBS				VOLUME	5.71(FT**3)					
DRY WEIGHT	54.03(LBS)				EXPENDABLE WEIGHT			100.05(LBS)			
RELIABILITY		.9737									.3 WATTS
IERR	10										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403			
EQUIPMENT QUANTITIES	1	1	4	1			
WEIGHT	97.31 LBS				VOLUME	2.04(FT**3)	POWER REQUIREMENT 63.5 WATTS
RELIABILITY		.9047					
IERR	2						

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312
EQUIPMENT QUANTITIES	2	1	2	2	3	1	2	2
WEIGHT	25.04 LBS				VOLUME	.35(FT**3)		POWER REQUIREMENT 35.4 WATTS
RELIABILITY		.9916						
IERR	*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	430	532	269	650	702		
EQUIPMENT QUANTITIES	2	11	2	2	1		
WEIGHT	322.82 LBS				VOLUME	4.78(FT**3)	POWER DISSIPATION 1966.9 WATTS
HARNESS WEIGHT		166.4(LBS)			SOLAR ARRAY WEIGHT		231.3(LBS)
RELIABILITY		.9087					

MISSION EQUIPMENT

WEIGHT	1950.00 LBS	VOLUME	77.03(FT**3)	POWER REQUIREMENT	1194.0 WATTS
RELIABILITY		.9000			

VI-192

DP SEASAT C02-1-1

* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	61.7 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	5963.1 (BTU/HR),	TOTAL RADIATOR AREA	62.6 (FT**2)
HEAT PIPE	8063.7 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	6053.1 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	787.8 (WATT-IN)
		AVERAGE HEAT LOAD	4678.5 (BTU/HR)

THERMAL CONTROL WEIGHT	
	UNIT WEIGHT (LBS)
INSULATION	14.9
HEAT PIPES	5.1
PHASE CHANGE MATERIAL	3.1
RADIATOR (ACTIVE)	108.2
TOTAL	131.3

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.026 (IN)			
STRINGER NO., THICKNESS, HT.	145.	3920.970 (IN),	.469 (IN)	
FRAME NO., THICKNESS, HT.	5.	.135 (IN),	.673 (IN)	
GRID BEAM THICKNESS	.231 (IN),	6.496 (IN),	3.248 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	0.000 (IN),	.030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	134.1 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	53.6 (LBS)			
ADAPTER WEIGHT	121.0 (LBS)			

VI-193

OP SEASAT C02-1-1

* *. ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	PEACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

761-1A

OP SEASAT CD2-1-1

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	AD.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
430	DISCHGE REGULATOR	2.	40.0	1.0	0.0
532	SHUNT REGULATOR	11	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1950.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	54.0
DATA PROCESSING	97.3
COMMUNICATIONS	29.0
BATTERIES	142.6
POWER CONTROL	180.3
SOLAR ARRAY	231.3
HARNESS	166.4
STRUCTURE	212.8
SOLAR ARRAY DRIVE	38.4
THERMAL CONTROL	131.3
DRY WEIGHT	3291.8
PROPELLANT	100.0
SATELLITE ADAPTER	121.0

TOTAL LAUNCH WEIGHT 3512.9

V1-195

US GOVT LEO CD3-1-1 , CD3-2-2

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 14449. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = C. (IPS)

CDPT TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
3.
1.0000
32.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0000
64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 610.02 WATTS
TOTAL SOLAR ARRAY AREA 131.44 SQ FT
INSTALLED BATTERY CAPACITY 40.00 AMP-HR
BEGINNING OF LIFE POWER 1619.01 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1302.2 LBS (590.7 KG) LAUNCH WEIGHT = 1352.1 LBS (613.3 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 36.6 IN. (.93 M) 41.0 IN. (1.55 M) 61.0 IN. (1.55 M)
MISSION EQUIPMENT 24.9 IN. (.63 M) 41.4 IN. (1.05 M) 41.4 IN. (1.05 M)
TOTAL SATELLITE 61.5 IN. (1.56 M)
MOMENTS OF INERTIA (SLUGS*FT*2) IXX = 344.3 IYY = 676722.7 IZZ = 1736828.1
X-CG Y-CG Z-CG
CENTER OF GRAVITY 33.2 IN. (.84 M) 0.0 IN. (0.00 M) 7.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 450.1 / 450.1 / 98.7
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 31.5 (MO)
RELIABILITY .710

VI-196

US GOVT LEO CD3-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24 (FT**3)

RELIABILITY .9675

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121

EQUIPMENT QUANTITIES 18 4 5 9 2 1 1

WEIGHT 142.73 LBS VOLUME 4.89 (FT**3)

DRY WEIGHT 60.63 (LBS), EXPENDABLE WEIGHT

RELIABILITY .9655

IERR 10

506 701 1203 603
1 2 1 1
POWER REQUIREMENT 13 WATTS
82.09 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 4 1

WEIGHT 97.31 LBS VOLUME 2.04 (FT**3)

RELIABILITY .9047

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227

EQUIPMENT QUANTITIES 2 1 2 1 3 1 2

WEIGHT 25.12 LBS VOLUME .30 (FT**3)

RELIABILITY .9838

IERR*****

312 2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 531 239 609 702

EQUIPMENT QUANTITIES 2 8 2 3 1

WEIGHT 162.70 LBS VOLUME 4.19 (FT**3)

HARNESS WEIGHT 68.7 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9488

POWER DISSIPATION 776.0 WATTS
91.5 (LBS)

MISSION EQUIPMENT

WEIGHT 490.00 LBS VOLUME 19.38 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT 290.0 WATTS

VI-197

US GOVT LEO C03-1-1

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	21.0 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	2028.3 (BTU/HR),	TOTAL RADIATOR AREA	22.1 (FT**2)
HEAT PIPE	21574.7 (WATT-IN),	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	2125.2 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	622.3 (WATT-IN)
		AVERAGE HEAT LOAD	1595.9 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	UNIT WEIGHT (LBS)
HEAT PIPES	12.2
PHASE CHANGE MATERIAL	4.0
RADIATOR (PASSIVE)	2.9
	13.3

TOTAL	32.4

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.016 (IN)		
SPRINGER NO., THICKNESS, HT.	178.	3945.825 (IN),	.362 (IN)
FRAME NO., THICKNESS, HT.	5.	.104 (IN),	.519 (IN)
GRID BEAM THICKNESS	.144 (IN),	SPACING 4.057 (IN),	HEIGHT 2.029 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	95.17 (LBS)		
SOLAR ARRAY BOOM AND CRIVE WT.	30.4 (LBS)		
ADAPTER WEIGHT	49.19 (LBS)		

861-1A

US GOVT LEO C03-1-1

* * . ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	7.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.6	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG CCND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-199

US GOVT LEO C03-1-1

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	8	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	490.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	60.6
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	95.4
SOLAR ARRAY	91.5
HARNESS	68.7
STRUCTURE	133.5
SOLAR ARRAY DRIVE	15.2
THERMAL CONTROL	32.4
DRY WEIGHT	1220.1
PROPELLANT	62.1
SATELLITE ADAPTER	49.9

TOTAL LAUNCH WLIGHT 1352.1

VI-200

PRIVATE INDUSTRY LEO CO3-1-12

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 14449. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

CDPT TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
3.	2.
1.0000	1.00
32.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 610.02 WATTS

TOTAL SOLAR ARRAY AREA 131.44 SQ FT

INSTALLED BATTERY CAPACITY 40.00 AMP-HR

BEGINNING OF LIFE POWER 1619.01 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1302.2 LBS (590.7 KG)

LAUNCH WEIGHT = 1352.1 LBS (613.3 KG)

DIMENSIONS LENGTH

HEIGHT

EQUIPMENT BAY 36.6 IN. (.93 M)

61.0 IN. (1.55 M)

MISSION EQUIPMENT 24.9 IN. (.63 M)

41.4 IN. (1.05 M)

TOTAL SATELLITE 61.5 IN. (1.56 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

344.3 IYY = 676722.7 IZZ = 1736828.1

X-CG

Y-CG

CENTER OF GRAVITY 33.2 IN. (.84 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 450. / 450. / 98.7

MISSION LIFETIME 36.10 (MO)

MEAN MISSION DURATION 31.5 (MO)

RELIABILITY .710

VI-201

PRIVATE INDUSTRY LTD 002-1-12

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 2 2 1 2
WEIGHT 43.00 LBS VOLUME 1.24 (FT**3)
RELIABILITY .9675
IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 816 834 906 1003 499 203 1121
EQUIPMENT QUANTITIES 1 4 5 9 2 1 1
WEIGHT 142.73 LBS VOLUME 4.89 (FT**3)
DRY WEIGHT 60.63 (LBS), EXPENDABLE WEIGHT
RELIABILITY .9655
IERR 10

506 701 1203 601
1 2 1 1
POWER REQUIREMENT .3 WATTS
82.09 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 4 1
WEIGHT 97.31 LBS VOLUME 2.04 (FT**3)
RELIABILITY .9047
IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227
EQUIPMENT QUANTITIES 2 1 2 1 3 1 2
WEIGHT 25.12 LBS VOLUME .30 (FT**3)
RELIABILITY .9838
IERR*****

312
2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 531 239 609 702
EQUIPMENT QUANTITIES 2 8 2 3 1
WEIGHT 162.70 LBS VOLUME 4.19 (FT**3)
HARNESS WEIGHT 68.7 (LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9488

POWER DISSIPATION 776.0 WATTS
91.5 (LBS)

MISSION EQUIPMENT

WEIGHT 490.00 LBS VOLUME 19.38 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 290.0 WATTS

V1-202

PRIVATE INDUSTRY LTD CO3-1-X' 2

* * * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	21.0 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	2028.3 (BTU/HR),	TOTAL RADIATOR AREA	22.1 (FT**2)
HEAT PIPE	21574.7 (WATT-IN),	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	2125.2 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	622.3 (WATT-IN)
		AVERAGE HEAT LOAD	1595.9 (BTU/HR)

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	12.2	
HEAT PIPES	4.0	
PHASE CHANGE MATERIAL	2.9	
RADIATOR (PASSIVE)	13.3	

TOTAL	32.4	

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	178. ,	3945.825 (IN),	.362 (IN)	
FRAME NO., THICKNESS, HT.	5. ,	.104 (IN),	.519 (IN)	
GRID BEAM THICKNESS	.144 (IN),	4.057 (IN),	2.029 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	0.000 (IN),	.030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	95.7 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	30.4 (LBS)			
ADAPTER WEIGHT	49.9 (LBS)			

VI-203

PRIVATE INDUSTRY LEO COB-1-2 2

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	16	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	"	.8	.0	0.0
312	TRANSMITTER	"	2.2	.0	15.8

VI-204

PRIVATE INDUSTRY LEO C03-1-1 ✓✓

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	8	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	490.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	60.6
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	95.4
SOLAR ARRAY	91.5
HARNESS	68.7
STRUCTURE	133.5
SOLAR ARRAY DRIVE	15.2
THERMAL CONTROL	32.4
DRY WEIGHT	1220.1
PROPELLANT	82.1
SATELLITE ADAPTER	49.9

TOTAL LAUNCH WEIGHT 1352.1

VI-205

US GOVT GEN 003-1-3 003-1-4

***** SYSTEM DESCRIPTION -- DESIGN NUMBER 1*****

STABILIZATION AND CONTROL
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
 POINTING ACCURACY = .200000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 35956.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.1(IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
PI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	129.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 678.16 WATTS
 TOTAL SOLAR ARRAY AREA 77.58 SQ FT
 INSTALLED BATTERY CAPACITY 100.00 AMP-HR
 BEGINNING OF LIFE POWER 987.75 WATTS

VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 1432.2 LBS (649.7 KG) LAUNCH WEIGHT = 1486.4 LBS (674.2 KG)
 DIMENSIONS
 EQUIPMENT BAY 42.4 IN. (1.08 M) 70.7 IN. (1.80 M) 70.7 IN. (1.80 M)
 MISSION EQUIPMENT 20.9 IN. (.53 M) 34.8 IN. (.88 M) 34.8 IN. (.88 M)
 TOTAL SATELLITE 63.3 IN. (1.61 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 280.4 IYY = 859508.7 IZZ = 1297244.
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 30.5 IN. (.77 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0
 MISSION LIFETIME 60.0(MO)
 PEAK MISSION DURATION 50.6(MO)
 RELIABILITY .1602

VI-206

US GOVT GEO C03-1-3, C03-1-4

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL.

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 3 2 2 2

WEIGHT 60.00 LBS VOLUME 1.93(FT**3)

RELIABILITY .9903

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 2 1 1

WEIGHT 278.57 LBS VOLUME 6.92(FT**3)

DRY WEIGHT 74.27(LBS), EXPENDABLE WEIGHT..

RELIABILITY .9484

IERR 11

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
204.30(LBS)..

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 2 2 4 2

WEIGHT 127.42 LBS VOLUME 2.59(FT**3)

RELIABILITY .7979

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202

EQUIPMENT QUANTITIES 1 2 2 2 3 2 1

WEIGHT 47.94 LBS VOLUME 1.82(FT**3)

RELIABILITY .9921

IERR*****

312
2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 515 269 650 702

EQUIPMENT QUANTITIES 3 9 2 2 2

WEIGHT 262.13 LBS VOLUME 6.45(FT**3)

MASS WEIGHT 69.8(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8994

POWER DISSIPATION 114.5 WATTS
54.0(LBS)

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 320.0 WATTS

VI-207

US GOVT GED C03-1-3, C03-1-4

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	17.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1593.9 (BTU/HR),	TOTAL RADIATOR AREA	17.9 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	683.9 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	640.8 (WATT-IN)
		AVERAGE HEAT LOAD	1698.2 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	13.8
HEAT PIPES	4.2
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	10.8
TOTAL	31.8

IERR 11C00G1011

STRUCTURES

SKIN THICKNESS	.017 (IN)		
SPRINGER NO., THICKNESS, HT.	187.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.400 (IN)
GRID BEAM THICKNESS	.152 (IN),	.115 (IN),	.574 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	SPACING 4.265 (IN),	HEIGHT 2.142 (IN)
EQUIPMENT BAY STRUCTURE WT.	157.1 (LBS)	CENTER 0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND CRIVE WT.	24.2 (LBS)		
ADAPTER WEIGHT	54.2 (LBS)		

VI-208

US GOVT GEO C03-1-3, C03-1-4

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION.

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMND DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	FASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	2	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

V1-209

US GOVT GEO CO3-1-3, CO3-1-4

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	3	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	74.3
DATA PROCESSING	127.4
COMMUNICATIONS	47.9
BATTERIES	142.6
POWER CONTROL	119.6
SOLAR ARRAY	54.0
HARNESS	89.8
STRUCTURE	181.7
SOLAR ARRAY DRIVE	9.0
THERMAL CONTROL	31.8
DFY WEIGHT	1228.0
PROPELLANT	204.3
SATELLITE ADAPTER	54.2

TOTAL LAUNCH WEIGHT 1486.4

VI-210

SPOT C03-2-1

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 14443. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PLR SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
3.	2.
1.0000	1.0000
32.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 580.02 WATTS
TOTAL SOLAR ARRAY AREA 124.98 SQ FT
INSTALLED BATTERY CAPACITY 40.00 AMP-HR
BEGINNING OF LIFE POWER 1539.39 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 1279.0 LBS (580.2 KG) LAUNCH WEIGHT = 1328.1 LBS (602.4 KG)
DIMENSIONS
EQUIPMENT BAY 36.6 IN. (.93 M) 60.9 IN. (1.55 M) 60.9 IN. (1.55 M)
MISSION EQUIPMENT 24.7 IN. (.63 M) 41.1 IN. (1.05 M) 41.1 IN. (1.05 M)
TOTAL SATELLITE 61.2 IN. (1.56 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 320.1 IYY = 661558.1 IZZ = 1618686.2
X-CG Y-CG Z-CG
CENTER OF GRAVITY 33.0 IN. (.84 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 450.7 450.7 98.7
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 31.5 (MO)
RELIABILITY .710

Y1-211

SPOT C03-2-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24(FT**3)

RELIABILITY .9675

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121

EQUIPMENT QUANTITIES 8 4 5 9 2 1 1

WEIGHT 142.70 LBS VOLUME 4.89(FT**3)

DRY WEIGHT 60.63(LBS), EXPENDABLE WEIGHT

RELIABILITY .9655

IERR 10

506 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
82.07(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 4 1

WEIGHT 97.31 LBS VOLUME 2.04(FT**3)

RELIABILITY .9047

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227

EQUIPMENT QUANTITIES 2 1 2 1 3 1 2

WEIGHT 25.12 LBS VOLUME .30(FT**3)

RELIABILITY .9838

IERR*****

312 2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 531 239 609 702

EQUIPMENT QUANTITIES 2 7 2 3 1

WEIGHT 156.37 LBS VOLUME 4.13(FT**3)

HARNESS WEIGHT 67.3(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9490

POWER DISSIPATION 737.8 WATTS
87.0(LBS)

MISSION EQUIPMENT

WEIGHT 480.00 LBS VOLUME 18.99(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 260.0 WATTS

VI-215

SPOT C03-2-1

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	19.7 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	1896.4 (BTU/HR),	TOTAL RADIATOR AREA	20.8 (FT**2)
HEAT PIPE	20117.8 (WATT-IN),	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	1993.3 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	620.1 (WATT-IN)
		AVERAGE HEAT LOAD	1493.6 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	12.1
HEAT PIPES	4.0
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	12.5
TOTAL	31.5

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	179. ,	3945.825 (IN),	.360 (IN)	
FRAME NO., THICKNESS, HT.	5. ,	.103 (IN),	.517 (IN)	
GRID BEAM THICKNESS	.143 (IN),	SPACING 4.021 (IN),	HEIGHT 2.011 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	94.8 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	29.6 (LBS)			
ADAPTER WEIGHT	49.1 (LBS)			

V1-213

SPOT C03-2-1

♦ ♦ ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

11-214

SPOT CO3-2-1

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	7	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	480.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	60.6
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	91.0
SOLAR ARRAY	87.0
HARNESS	67.3
STRUCTURE	132.2
SOLAR ARRAY DRIVE	14.4
THERMAL CONTROL	31.5
DRY WEIGHT	1197.0
PROPELLANT	82.1
SATELLITE ADAPTER	49.1

TOTAL LAUNCH WEIGHT 1328.1

V1-215

ETS-III C03-2-3

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 3855. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	4.	2.
SUBFRAME RATE	1250	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER
CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 370.02 WATTS
TOTAL SOLAR ARRAY AREA 79.73 SQ FT
INSTALLED BATTERY CAPACITY 24.00 AMP-HR
BEGINNING OF LIFE POWER 482.05 WATTS

VEHICLE SIZING
CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 588.3 LBS (266.8 KG) LAUNCH WEIGHT = 610.7 LBS (277.0 KG)
DIMENSIONS
EQUIPMENT BAY 32.9 IN. (.84 M) 54.9 IN. (1.39 M) 54.9 IN. (1.39 M)
MISSION EQUIPMENT 12.0 IN. (.30 M) 20.0 IN. (.51 M) 20.0 IN. (.51 M)
TOTAL SATELLITE 44.9 IN. (1.14 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 124.5 IYY = 213068.2 IZZ = 596961.0
X-CG Y-CG Z-CG
CENTER OF GRAVITY 22.5 IN. (.57 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 450. / 450. / 98.7
MISSION LIFETIME 36.0 (MO)
MEAN MISSION DURATION 31.12 (MO)
RELIABILITY .703

VI-216

ETS-III C03-2-3

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24 (FT**3)

RELIABILITY .9675

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1112

EQUIPMENT QUANTITIES 12 4 5 9 2 1 2

WEIGHT 62.98 LBS VOLUME 4.15 (FT**3)

DRY WEIGHT 41.07 (LBS), EXPENDABLE WEIGHT

RELIABILITY .9803

IERR 10

503 701 1203 603
1 2 1 1
POWER REQUIREMENT
21.90 (LBS)

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 4 1

WEIGHT 97.31 LBS VOLUME 2.04 (FT**3)

RELIABILITY .9047

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227

EQUIPMENT QUANTITIES 2 1 2 1 3 1 2

WEIGHT 25.12 LBS VOLUME .30 (FT**3)

RELIABILITY .9838

IERR*****

312

POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 221 603 702

EQUIPMENT QUANTITIES 2 9 2 3 1

WEIGHT 96.86 LBS VOLUME 1.48 (FT**3)

HARNESS WEIGHT 37.5 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9248

POWER DISSIPATION 470.7 WATTS
55.5 (LBS)

MISSION EQUIPMENT

WEIGHT 55.00 LBS VOLUME 2.18 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT 50.0 WATTS

VI-217

ETS-III C03-2-3

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	10.3 (FT**2),	BATTERY RADIATOR AREA	10.6 (FT**2)
HEATER POWER	973.4 (BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	7684.9 (WATT-IN),	BATTERY HEATER POWER	49.8 (BTU/HR)
HEAT PIPE LENGTH	2.8 (FT)	TOTAL HEATER POWER	1023.2 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.-	455.0 (WATT-IN)
		AVERAGE HEAT LOAD	777.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	9.4
HEAT PIPES	2.9
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	6.5
TOTAL	21.7

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.011 (IN)		
STRINGER NO., THICKNESS, HT.	206.5	3945.825 (IN),	.281 (IN)
FRAME NO., THICKNESS, HT.	.097 (IN),	.081 (IN),	.404 (IN)
GRID BEAM THICKNESS	.030 (IN),	SPACING 2.728 (IN),	HEIGHT 1.364 (IN)
ENCLOSER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	66.13 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	24.4 (LBS)		
ADAPTER WEIGHT	22.4 (LBS)		

VI-218

ETS-III C03-2-3

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1112	TANK	2	2.7	.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG CGND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-219

ETS-III CD3-2-3

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
221	BATTERY	2	9.8	.1	0.0
603	BATTERY CHARGE	3	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	55.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	41.1
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	39.6
POWER CONTROL	57.3
SOLAR ARRAY	55.5
HARNESS	37.5
STRUCTURE	84.0
SOLAR ARRAY DRIVE	9.2
THERMAL CONTROL	21.7
DRY WEIGHT	566.4
PROPELLANT	21.9
SATELLITE ADAPTER	22.4

TOTAL LAUNCH WEIGHT 610.7

VI-220

EARTH OBS. CO3-2-4

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 2 2 1 1
WEIGHT 37.90 LBS VOLUME 1.18(FT**3)
RELIABILITY .9550
IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603
EQUIPMENT QUANTITIES 12 4 5 9 2 1 1 1 2 1 1
WEIGHT 140.30 LBS VOLUME 4.65(FT**3)
DRY WEIGHT 58.23(LBS), EXPENDABLE WEIGHT 82.07(LBS)
RELIABILITY .9478
IERR 10

POWER REQUIREMENT .3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 3 1
WEIGHT 80.51 LBS VOLUME 1.67(FT**3)
RELIABILITY .9637
IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312
EQUIPMENT QUANTITIES 2 1 2 1 3 1 2 2
WEIGHT 25.12 LBS VOLUME .30(FT**3)
RELIABILITY .9838
IERR*****

POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 530 236 609 702
EQUIPMENT QUANTITIES 2 12 2 3 1
WEIGHT 128.74 LBS VOLUME 2.14(FT**3)
HARNESS WEIGHT 54.8(LBS), SOLAR ARRAY WEIGHT 83.2(LBS)
RELIABILITY .9104

POWER DISSIPATION 705.6 WATTS

MISSION EQUIPMENT

WEIGHT 480.00 LBS VOLUME 18.99(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 260.0 WATTS

VI-221

EARTH OBS C03-2-4

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	19.7 (FT**2),	BATTERY RADIATOR AREA	20.9 (FT**2)
HEATER POWER	1896.4 (BTU/HR),	TOTAL RADIATOR AREA	20.6 (FT**2)
HEAT PIPE	19202.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	1986.4 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	591.8 (WATT-IN)
		AVERAGE HEAT LOAD	1493.6 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	11.2
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	12.5
TOTAL	30.4

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	175.		3945.825 (IN),	.340 (IN)
FRAME NO., THICKNESS, HT.	5.		.098 (IN),	.488 (IN)
GRID BEAM THICKNESS	.138 (IN),	SPACING	3.885 (IN),	HEIGHT 1.943 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	83.9 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	29.0 (LBS)			
ADAPTER WEIGHT	45.3 (LBS)			

VI-222

EARTH OBS C03-2-4

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-223

EARTH OBS .. CO3-2-4

..* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
236	BATTERY	2	31.5	.3	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	480.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	58.2
DATA PROCESSING	80.5
COMMUNICATIONS	25.1
BATTERIES	63.0
POWER CONTROL	65.8
SOLAR ARRAY	83.2
HARNESS	54.8
STRUCTURE	112.2
SOLAR ARRAY DRIVE	13.8
THERMAL CONTROL	30.4
DRY WEIGHT	1104.9
PROPELLANT	82.1
SATELLITE ADAPTER	45.3

TOTAL LAUNCH WEIGHT 1232.2

V1-224

ESA GEO . CO3-2-5 , CO3-2-6

* *. SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 35960.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
3.	2.
1.0000	1.0000
32.	2.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 637.18 WATTS

TOTAL SOLAR ARRAY AREA 72.89 SQ FT

INSTALLED BATTERY CAPACITY 80.00 AMP-HR

BEGINNING OF LIFE POWER 928.06 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1264.9 LBS (573.7 KG) LAUNCH WEIGHT = 1312.8 LBS (595.5 KG)

DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 40.0 IN.(1.02 M) 66.7 IN.(1.69 M) 66.7 IN.(1.69 M)

MISSION EQUIPMENT 20.9 IN.(.53 M) 34.8 IN.(.88 M) 34.8 IN.(.88 M)

TOTAL SATELLITE 60.9 IN.(1.55 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 227.4 IYY = 702237.1 IZZ = 1078819.0

X-CG Y-CG Z-CG

CENTER OF GRAVITY 29.8 IN.(.76 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 49.7(MO)

RELIABILITY .606

V1-225

ESA GEO C03-2-5, C03-2-6

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 2 2 2 2
WEIGHT 58.40 LBS VOLUME 1.77(FT**3)
RELIABILITY .9856
IERR 10

POWER REQUIREMENT --- 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130
EQUIPMENT QUANTITIES 18 6 5 9 2 1 1
WEIGHT 278.59 LBS VOLUME 6.92(FT**3)
DRY WEIGHT 74.27(LBS), EXPENDABLE WEIGHT
RELIABILITY .9007
IERR 11

509 701 1203 603
1 2 1 1
POWER REQUIREMENT
204.32(LBS)

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 3 1
WEIGHT 80.51 LBS VOLUME 1.67(FT**3)
RELIABILITY .9342
IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202
EQUIPMENT QUANTITIES 1 1 2 2 3 1 1
WEIGHT 42.84 LBS VOLUME 1.75(FT**3)
RELIABILITY .9810
IERR*****

312
2

POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 515 266 650 702
EQUIPMENT QUANTITIES 2 9 2 2 1
WEIGHT 200.77 LBS VOLUME 4.43(FT**3)
HARNESS WEIGHT 68.3(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .8280

POWER DISSIPATION 107.6 WATTS
50.8(LBS)

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 320.0 WATTS

VI-226

ESA GEO C03-2-5, C03-2-6

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	17.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1593.9 (BTU/HR),	TOTAL RADIATOR AREA	17.9 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	1683.9 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	616.5 (WATT-IN)
		AVERAGE HEAT LOAD	1698.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	12.9
HEAT PIPES	4.0
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	10.8

TOTAL	30.7

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	187.		81910.347 (IN),	.377 (IN)
FRAME NO., THICKNESS, HT.	5.		.108 (IN),	.541 (IN)
GRID BEAM THICKNESS	.143 (IN),	SPACING	4.026 (IN),	HEIGHT 2.013 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	134.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	23.6 (LBS)			
ADAPTER WEIGHT	47.9 (LBS)			

VI-227

ESA GEO C03-2-5, C03-2-6

* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-2228

ESA GEO C03-2-5, C03-2-6

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
266	BATTERY	2	55.4	.3	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	74.3
DATA PROCESSING	80.5
COMMUNICATIONS	42.8
BATTERIES	110.9
POWER CONTROL	89.9
SOLAR ARRAY	50.8
HARNESSES	68.3
STRUCTURE	155.6
SOLAR ARRAY DRIVE	8.4
THERMAL CONTROL	30.7
DRY WEIGHT	1060.6
PROPELLANT	204.3
SATELLITE ADAPTER	47.9

TOTAL LAUNCH WEIGHT 1312.8

V1-229

ITDS F/D CD4-1-2

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 15399.(LB-SEC).

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- GENERAL PURPOSE PROCESSOR
COMPUTER OPERATIONS RATE = 12600.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
125.	0.
8.	0.
4.	0.
1.0000	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 560.86 WATTS
TOTAL SOLAR ARRAY AREA 97.71 SQ FT
INSTALLED BATTERY CAPACITY 24.00 AMP-HR
BEGINNING OF LIFE POWER 1203.50 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1245.3 LBS (564.9 KG) LAUNCH WEIGHT = 1292.6 LBS (586.3 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH	
EQUIPMENT BAY	32.9 IN.(.84 M)	54.9 IN.(1.39 M)	54.9 IN.(1.39 M)		
MISSION EQUIPMENT	25.7 IN.(.65 M)	42.8 IN.(1.09 M)	42.8 IN.(1.09 M)		
TOTAL SATELLITE	58.6 IN.(1.49 M)				

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 212.8 IYY = 568273.0 IZZ = 1126480.0

X-CG		Y-CG		Z-CG	
CENTER OF GRAVITY	31.8 IN.(.81 M)	0.0 IN.(0.00 M)	0.0 IN.(0.00 M)		

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 450./ 450./ 98.7
MISSION LIFETIME 36.0(MO)
MEAN MISSION DURATION 31.4(MO)
RELIABILITY .712

VI-230

ITOS F/O C04-1-2

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 2 2

WEIGHT 58.40 LBS VOLUME 1.77(FT**3)

RELIABILITY .9946

IERR 10

POWER REQUIREMENT --- 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121

EQUIPMENT QUANTITIES 18 4 5 9 2 1 1

WEIGHT 148.13 LBS VOLUME 4.89(FT**3)

DRY WEIGHT 60.63(LBS), EXPENDABLE WEIGHT

RELIABILITY .9655

IERR 10

506 701 1203 603
1 2 1 1
POWER REQUIREMENT --- .3 WATTS
87.49(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - GENERAL PURPOSE PROCESSOR

EQUIPMENT CODE IDENTIFIER 103 203 348 403

EQUIPMENT QUANTITIES 2 1 2 1

WEIGHT 89.78 LBS VOLUME .95(FT**3)

RELIABILITY .8955

IERR 1

POWER REQUIREMENT 35.7 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 227 106 303 401 503 603

EQUIPMENT QUANTITIES 2 2 2 2 3 1

WEIGHT 25.34 LBS VOLUME .33(FT**3)

RELIABILITY .9927

IERR*****

POWER REQUIREMENT 18.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 112 221 306 1202

EQUIPMENT QUANTITIES 12 2 2 1

WEIGHT 104.00 LBS VOLUME 1.27(FT**3)

HARNESS WEIGHT 60.5(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9263

POWER DISSIPATION 469.4 WATTS
68.0(LBS)

MISSION EQUIPMENT

WEIGHT 540.00 LBS VOLUME 21.36(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 305.0 WATTS

VI-231

ITOS F/O C04-1-2

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	19.7 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	1899.3 (BTU/HR),	TOTAL RADIATOR AREA	20.5 (FT**2)
HEAT PIPE	19260.6 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	1962.9 (BTU/HR)
STORED ENERGY	117.2 (BTU)	VARIABLE CONDUCTANCE H.P.	758.1 (WATT-IN)
		AVERAGE HEAT LOAD	1494.4 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	11.0
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	12.5
TOTAL	30.3

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	170.		3945.825 (IN),	.340 (IN)
FRAME NO., THICKNESS, HT.	5.		.098 (IN),	.488 (IN)
GRID BEAM THICKNESS	.142 (IN),	SPACING	3.992 (IN),	HEIGHT 1.996 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	86.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	26.5 (LBS)			
ADAPTER WEIGHT	47.3 (LBS)			

VI-232

ITOS F/O C04-1-2

* * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	GEN PURP PROCESR	2	12.8	.0	15.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
348	TAPE RECORDER	2	21.5	.2	10.2
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
303	TRANSMITTER	2	2.2	.0	10.2
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-233

ITOS F/O C04-1-2

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	12	1.4	.0	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	540.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	60.6
DATA PROCESSING	89.8
COMMUNICATIONS	25.3
BATTERIES	50.6
POWER CONTROL	53.4
SOLAR ARRAY	68.0
HARNESSES	60.5
STRUCTURE	109.6
SOLAR ARRAY DRIVE	11.3
THERMAL CONTROL	30.3
DRY WEIGHT	1157.8
PROPELLANT	87.5
SATELLITE ADAPTER	47.3

TOTAL LAUNCH WEIGHT 1292.6

V1-234

NOAA F/O C04-1-3

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 15413.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- GENERAL PURPOSE PROCESSOR

COMPUTER OPERATIONS RATE = 12600.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.

256.

125.

8.

4.

1.0000

64.

MISSION EQUIPMENT DATA

0.

0.

0.

0.

0.

0.0000

0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 655.86 WATTS

TOTAL SOLAR ARRAY AREA 123.44 SQ FT

INSTALLED BATTERY CAPACITY 28.00 AMP-HR

BEGINNING OF LIFE POWER 1520.50 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1360.0 LBS (616.9 KG)

LAUNCH WEIGHT = 1411.3 LBS (640.2 KG)

DIMENSIONS LENGTH

HEIGHT

WIDTH

EQUIPMENT BAY 32.6 IN.(.83 M)

54.3 IN.(1.38 M)

54.3 IN.(1.38 M)

MISSION EQUIPMENT 26.6 IN.(.68 M)

44.3 IN.(1.13 M)

44.3 IN.(1.13 M)

TOTAL SATELLITE 59.2 IN.(1.50 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

287.3 IYY = 625671.2

IZZ = 1503380.5

CENTER OF GRAVITY 32.0 IN.(.81 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION

450./ 450./ 98.7

MISSION LIFETIME 36.0(MO)

MEAN MISSION DURATION 31.3(MO)

RELIABILITY .703

V1-235

NOAA F/O C04-1-3

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 2 2 2 2
WEIGHT 58.40 LBS VOLUME 1.77(FT**3)
RELIABILITY .9946
IERR 10

POWER REQUIREMENT -- 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603
EQUIPMENT QUANTITIES 18 4 5 9 2 1 1 1 2 1 1
WEIGHT 148.21 LBS VOLUME 4.89(FT**3)
DRY WEIGHT 60.63(LBS), EXPENDABLE WEIGHT 87.58(LBS)
RELIABILITY .9655
IERR 10

POWER REQUIREMENT -- 3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- GENERAL PURPOSE PROCESSOR
EQUIPMENT CODE IDENTIFIER 103 203 348 403
EQUIPMENT QUANTITIES 2 1 2 1
WEIGHT 89.78 LBS VOLUME .95(FT**3)
RELIABILITY .8955
IERR 1

POWER REQUIREMENT 35.7 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
EQUIPMENT CODE IDENTIFIER 227 106 303 401 503 603
EQUIPMENT QUANTITIES 2 2 2 2 3 1
WEIGHT 25.34 LBS VOLUME .33(FT**3)
RELIABILITY .9927
IERR*****

POWER REQUIREMENT 10.4 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT -PADOLE MOUNTED SOLAR ARRAY
EQUIPMENT CODE IDENTIFIER 130 224 309 1202
EQUIPMENT QUANTITIES 12 2 2 1
WEIGHT 127.79 LBS VOLUME 1.00(FT**3)
HARNESS WEIGHT 65.9(LBS), SOLAR ARRAY WEIGHT 86.0(LBS)
RELIABILITY .9146

POWER DISSIPATION 645.8 WATTS

MISSION EQUIPMENT

WEIGHT 600.00 LBS VOLUME 23.73(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 400.0 WATTS

V1-236

NCAA F/O CD4-1-3

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	24.0 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	2316.8 (BTU/HR),	TOTAL RADIATOR AREA	25.2 (FT**2)
HEAT PIPE	23671.2 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	2431.8 (BTU/HR)
STORED ENERGY	117.2 (BTU)	VARIABLE CONDUCTANCE H.P.	765.8 (WATT-IN)
		AVERAGE HEAT LOAD	1818.3 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		11.0
HEAT PIPES		3.9
PHASE CHANGE MATERIAL		2.9
RADIATOR (PASSIVE)		15.2

TOTAL		33.0

IERR 1111011011

STRUCTURES					
SKIN THICKNESS	.017 (IN)				
STRINGER NO., THICKNESS, HT.	166.		3945.825 (IN),		.346 (IN)
FRAME NO., THICKNESS, HT.	5.		.099 (IN),		.497 (IN)
GRID BEAM THICKNESS	.148 (IN),	SPACING	4.177 (IN),	HEIGHT	2.089 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	91.4 (LBS)				
SOLAR ARRAY BOOM AND DRIVE WT.	29.5 (LBS)				
ADAPTER WEIGHT	51.3 (LBS)				

V1-237

NCAA F/O CD4-1-3

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	GEN PURP PROCESR	2	12.8	.0	15.0
203	DIGITAL TELEMTRY	1	8.9	.2	3.0
348	TAPE RECORDER	2	21.5	.2	10.2
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
303	TRANSMITTER	2	2.2	.0	10.2
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-238

NOAA F/D C04-1-3

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
130	SHUNT REGULATOR	12	2.7	.0	0.0
224	BATTERY	2	29.1	.2	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	60.6
DATA PROCESSING	89.8
COMMUNICATIONS	25.3
BATTERIES	58.2
POWER CONTROL	69.6
SOLAR ARRAY	86.0
HARNES	65.9
STRUCTURE	111.4
SOLAR ARRAY DRIVE	14.3
THERMAL CONTROL	33.0
DRY WEIGHT	1272.4
PROPELLANT	87.6
SATELLITE ADAPTER	51.3

TOTAL LAUNCH WEIGHT 1411.3

VI-239

METEOSAT F/O CO4-2-2

* * * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 25784.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

COPY TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
32.	128.
10.	100.
8.	8.
3.	2.
.125	1.000
64.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 337.41 WATTS

TOTAL SOLAR ARRAY AREA 142.18 SQ FT

INSTALLED BATTERY CAPACITY 28.00 AMP-HR

BEGINNING OF LIFE POWER 459.90 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1307.1 LBS (592.9 KG)

DIMENSIONS LENGTH

EQUIPMENT BAY 62.5 IN.(1.59 M)

MISSION EQUIPMENT 20.9 IN.(.53 M)

TOTAL SATELLITE 83.4 IN.(2.12 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

LAUNCH WEIGHT = 1364.7 LBS (619.0 KG)

HEIGHT

104.2 IN.(2.65 M)

34.8 IN.(.88 M)

34.8 IN.(.88 M)

IYY = 1653353.2

IYY = 1653353.2

IYY = 1653353.2

IYY = 1653353.2

CENTER OF GRAVITY 46.1 IN.(1.17 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 50.7(MO)

RELIABILITY .603

V1-240

METEOSAT F/D CO4-2-2

* * * SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80(FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 223.33 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 48.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8252
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
154.99(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403
EQUIPMENT QUANTITIES 1 1 3 1
WEIGHT 80.51 LBS VOLUME 1.67(FT**3)
RELIABILITY .9342
IERR 2

POWER REQUIREMENT 63.5 WATTS.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202
EQUIPMENT QUANTITIES 1 1 2 1 2 1 1
WEIGHT 37.42 LBS VOLUME 1.68(FT**3)
RELIABILITY .9570
IERR*****

312
2
POWER REQUIREMENT 35.4 WATTS.

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 224 309 1202
EQUIPMENT QUANTITIES 8 2 2 1
WEIGHT 128.99 LBS VOLUME 2.01(FT**3)
HARNESS WEIGHT 72.2(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9442

POWER DISSIPATION 31.7 WATTS.
69.9(LBS)

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 170.0 WATTS

VI-241

METEOSAT F/O CD4-2-2

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL
RADIATOR AREA

8.2 (FT**2),
HEATER POWER 784.9(BTU/HR),
HEAT PIPE 7536.3(WATT-IN),
HEAT PIPE LENGTH 5.2 (FT)
STORED ENERGY 85.9 (BTU)

BATTERY RADIATOR AREA
TOTAL RADIATOR AREA
BATTERY HEATER POWER
TOTAL HEATER POWER
VARIABLE CONDUCTANCE H.P.
AVERAGE HEAT LOAD

1.2. (FT**2)
9.4 (FT**2)
115.0(BTU/HR)
899.9(BTU/HR)
1079.1(WATT-IN)
956.0 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	23.0
HEAT PIPES	5.5
PHASE CHANGE MATERIAL	2.1
RADIATOR (PASSIVE)	5.2
TOTAL	35.8

IERR 1100010111

STRUCTURES

SKIN THICKNESS .015 (IN)
STRINGER NO., THICKNESS, HT.
FRAME NO., THICKNESS, HT.
GRID BEAM THICKNESS
ENDCOVER THICKNESS- FORWARD
EQUIPMENT BAY STRUCTURE WT.
SOLAR ARRAY ROOM AND DRIVE WT.
ADAPTER WEIGHT

240.		81910.347 (IN),	.457 (IN)
5.		.131 (IN),	.656 (IN)
.134 (IN),		3.788 (IN),	1.894 (IN)
.030 (IN),	CENTER	0.000 (IN),	.030 (IN)
141.1 (LBS)			
0.0 (LBS)			
57.7 (LBS)			

V1-242

METEOSAT F/O CD4-2-2

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMND DECOD+OISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-243

METEOSAT F/O CD4-2-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	80.5
COMMUNICATIONS	37.4
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	69.9
HARNESS	72.2
STRUCTURE	325.4
THERMAL CONTROL	35.8
DRY WEIGHT	1152.1
PROPELLANT	155.0
SATELLITE ADAPTER	57.7

TOTAL LAUNCH WEIGHT 1364.7

V1-244

GMS CD4-2-4

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 35996.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
64.
16.
8.
3.
1.0000
32.

MISSION EQUIPMENT DATA

0.
128.
100.
8.
2.
1.0001
64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 556.58 WATTS
TOTAL SOLAR ARRAY AREA 63.67 SQ FT
INSTALLED BATTERY CAPACITY 72.00 AMP-HR
BEGINNING OF LIFE POWER 810.66 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1388.8 LBS (630.0 KG)

LAUNCH WEIGHT = 1441.4 LBS (653.8 KG)

DIMENSIONS LENGTH

HEIGHT

WIDTH

EQUIPMENT BAY 37.8 IN.(.96 M)
MISSION EQUIPMENT 24.8 IN.(.63 M)
TOTAL SATELLITE 62.6 IN.(1.59 M)

63.0 IN.(1.60 M)
41.3 IN.(1.05 M)

63.0 IN.(1.60 M)
41.3 IN.(1.05 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

205.7 IYY = 768115.4

IZZ = 1055790.9

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 32.2 IN.(.82 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 49.6(MO)

RELIABILITY .605

V1-245

GMS C04-2-4

* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24 (FT**3)

RELIABILITY .9418

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 2 1 1

WEIGHT 278.80 LBS VOLUME 6.92 (FT**3)

DRY WEIGHT 74.27 (LBS), EXPENDABLE WEIGHT

RELIABILITY .9007

IERR 11

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
204.52 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 3 1

WEIGHT 80.51 LBS VOLUME 1.67 (FT**3)

RELIABILITY .9342

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202

EQUIPMENT QUANTITIES 1 1 2 2 3 1 1

WEIGHT 42.84 LBS VOLUME 1.75 (FT**3)

RELIABILITY .9810

IERR*****

312
2
POWER REQUIREMENT 32.4 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 263 650 702

EQUIPMENT QUANTITIES 2 8 2 2 1

WEIGHT 165.60 LBS VOLUME 2.35 (FT**3)

HARNESS WEIGHT 66.5 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8651

POWER DISSIPATION 94.0 WATTS
44.3 (LBS)

MISSION EQUIPMENT

WEIGHT 485.00 LBS VOLUME 19.18 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT 255.0 WATTS

772-11

GMS C04-2-4

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	14.8 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	1377.1 (BTU/HR),	TOTAL RADIATOR AREA	15.2 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	3.9 (FT)	TOTAL HEATER POWER	1410.4 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	633.4 (WATT-IN)
		AVERAGE HEAT LOAD	1476.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	12.6
HEAT PIPES	4.1
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	9.4
TOTAL	29.1

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.017 (IN)			
STRINGER NO. THICKNESS, HT.	177.	81910.347 (IN),		.375 (IN)
FRAME NO. THICKNESS, HT.	5.	.108 (IN),		.538 (IN)
GRID BEAM THICKNESS	.150 (IN),	SPACING 4.226 (IN),	HEIGHT 2.113 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	123.9 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	22.6 (LBS)			
ADAPTER WEIGHT	52.6 (LBS)			

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GMS C04-2-4

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALV.	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEAND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

V1-248

GHS C04-2-4

• • ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	8	2.3	.0	0.0
263	BATTERY	2	9.5	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	485.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	74.3
DATA PROCESSING	80.5
COMMUNICATIONS	42.8
BATTERIES	99.0
POWER CONTROL	66.6
SOLAR ARRAY	44.3
HARNESS	66.5
STRUCTURE	145.7
SOLAR ARRAY DRIVE	7.4
THERMAL CONTROL	29.1
DRY WEIGHT	1184.3
PROPELLANT	204.5
SATELLITE ADAPTER	52.6

TOTAL LAUNCH WEIGHT 1441.4

VI-249

INTELSAT V CC1-1-2

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1.***

STABILIZATION AND CONTROL
 CONFIGURATION -- SPIN CONTROL
 POINTING ACCURACY = .300000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 24125.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.(IPS)
 COPI TABLE

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA
 32.
 32.
 10.
 8.
 3.
 .1250
 64.

MISSION EQUIPMENT DATA
 0.
 128.
 100.
 8.
 2.
 1.0000
 64.

COMMUNICATIONS
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 1072.51 WATTS
 TOTAL SOLAR ARRAY AREA 446.12 SQ FT
 INSTALLED BATTERY CAPACITY 100.00 AMP-HR
 BEGINNING OF LIFE POWER 1443.06 WATTS

VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 2517.9 LBS (1142.1 KG) LAUNCH WEIGHT = 2629.3 LBS (1192.6 KI
 DIMENSIONS LENGTH HEIGHT WIDTH
 EQUIPMENT BAY 204.5 IN.(5.19 M) 100.0 IN.(2.54 M) 100.0 IN.(2.54 M)
 MISSION EQUIPMENT 29.9 IN.(.76 M) 49.8 IN.(1.26 M) 49.8 IN.(1.26 M)
 TOTAL SATELLITE 234.3 IN.(5.95 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 602.8 IYY = 17460586.1 IZZ = 17460586.1
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 167.1 IN.(4.24 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
 MISSION LIFETIME 60.0(MO)
 MEAN MISSION DURATION 49.9(MO)
 RELIABILITY .617

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INTELSAT V CC1-1-2

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL									
EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413			
EQUIPMENT QUANTITIES	1	1	1	2	2	1			
WEIGHT	43.50 LBS								
VOLUME					1.80(FT**3)				
RELIABILITY		.9618							
IERR	0								
POWER REQUIREMENT									10.4 WATT

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT									
EQUIPMENT CODE IDENTIFIER	829	834	906	1003	499	203	1124	515	701
EQUIPMENT QUANTITIES	6	2	5	9	2	1	1	1	1
WEIGHT	216.82 LBS								
VOLUME					5.54(FT**3)				
DRY WEIGHT	75.24(LBS)								
EXPENDABLE WEIGHT									
RELIABILITY		.9013							
IERR	11								
POWER REQUIREMENT									.3 WATT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)									
EQUIPMENT CODE IDENTIFIER	203	203	403						
EQUIPMENT QUANTITIES	1	1	1						
WEIGHT	30.11 LBS								
VOLUME					.54(FT**3)				
RELIABILITY		.9505							
IERR	2								
POWER REQUIREMENT									13.5 WATT

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK									
EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603	202	312	
EQUIPMENT QUANTITIES	1	1	2	1	3	1	1	2	
WEIGHT	38.92 LBS								
VOLUME					1.70(FT**3)				
RELIABILITY		.9683							
IERR*****									
POWER REQUIREMENT									35.4 WATT

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY									
EQUIPMENT CODE IDENTIFIER	130	269	389	1202					
EQUIPMENT QUANTITIES	11	2	2	1					
WEIGHT	234.06 LBS								
VOLUME					1.48(FT**3)				
HARNESS WEIGHT		102.6(LBS)							
SOLAR ARRAY WEIGHT									
RELIABILITY		.8593							
POWER DISSIPATION									85.5 WATT

MISSION EQUIPMENT

WEIGHT	850.00 LBS								
VOLUME					33.60(FT**3)				
RELIABILITY		.9970							
POWER REQUIREMENT									980.0 WATT

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INTELSAT V CC1-1-2

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	30.4 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	3011.4 (BTU/HR),	TOTAL RADIATOR AREA	31.5 (FT**2)
HEAT PIPE	182713.8 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	14.6 (FT)	TOTAL HEATER POWER	3126.4 (BTU/HR)
STORED ENERGY	77.4 (BTU)	VARIABLE CONDUCTANCE H.P.	3031.9 (WATT-IN)
		AVERAGE HEAT LOAD	3544.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	55.1
HEAT PIPES	15.4
PHASE CHANGE MATERIAL	1.9
RADIATOR (ACTIVE)	63.4
TOTAL	135.8

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.031 (IN)			
STRINGER NO., THICKNESS, HT.	166.		81910.347 (IN),	.637 (IN)
FRAME NO., THICKNESS, HT.	14.		.183 (IN),	.914 (IN)
GRID BEAM THICKNESS	.179 (IN),	SPACING	5.044 (IN),	HEIGHT 2.522 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	192.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER HEIGHT	111.4 (LBS)			

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C-4

INTELSAT V CCI-1-2

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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INTELSAT V CC1-1-2

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
130	SHUNT REGULATOR	11	2.7	.0	0.0
269	BATTERY	2	91.1	.5	0.0
389	BATTERY CHARGER	2	5.3	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	850.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	75.2
DATA PROCESSING	30.1
COMMUNICATIONS	38.9
BATTERIES	182.2
POWER CONTROL	51.9
CONVERTERS	15.9
SOLAR ARRAY	219.3
HARNES S	102.6
STRUCTURE	646.8
THERMAL CONTROL	135.8
DRY WEIGHT	2376.3
PROPELLANT	141.6
SATELLITE ADAPTER	111.4

TOTAL LAUNCH WEIGHT 2629.3

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INTELSAT VI CC1-1-3

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 124720.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
125.	0.
8.	0.
4.	0.
1.0000	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 1295.56 WATTS

TOTAL SOLAR ARRAY AREA 149.88 SQ FT

INSTALLED BATTERY CAPACITY 200.00 AMP-HR

BEGINNING OF LIFE POWER 1908.39 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 3051.5 LBS (1384.1 KG) LAUNCH WEIGHT = 3159.6 LBS (1433.2 KI

DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 47.4 IN.(1.20 M) 78.9 IN.(2.00 M) 78.9 IN.(2.00 M)

MISSION EQUIPMENT 30.9 IN.(.78 M) 51.5 IN.(1.31 M) 51.5 IN.(1.31 M)

TOTAL SATELLITE 78.3 IN.(1.99 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 845.2 IYY = 2585661.6 IZZ = 4190166.9

X-CG Y-CG Z-CG

CENTER OF GRAVITY 38.5 IN.(.98 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 84.0(MO)

MEAN MISSION DURATION 70.1(MO)

RELIABILITY .501

VI-256

INTELSAT VI CC1-1-3

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303			
EQUIPMENT QUANTITIES	3	3	2	2			
WEIGHT	67.10 LBS				VOLUME	2.06(FT**3)	POWER REQUIREMENT 78.9 WATT
RELIABILITY		.9937					
IERR	10						

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	907	1003	499	203	1130	524	701	1203	603
EQUIPMENT QUANTITIES	18	8	5	9	2	1	4	1	2	1	1
WEIGHT	851.58 LBS										
DRY WEIGHT	147.67(LBS)										
RELIABILITY		.8103									
IERR	1										
											.3 WATT
											703.91(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403				
EQUIPMENT QUANTITIES	2	2				
WEIGHT	42.36 LBS				VOLUME	.78(FT**3)
RELIABILITY		.9990				POWER REQUIREMENT 10.5 WATT
IERR	1					

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	106	327	401	503	605
EQUIPMENT QUANTITIES	1	3	2	2	4	2
WEIGHT	39.14 LBS					
RELIABILITY		.9928				
IERR	*****					
						POWER REQUIREMENT 25.5 WATT
						1.09(FT**3)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	412	531	269	650	702	
EQUIPMENT QUANTITIES	4	9	4	4	2	
WEIGHT	447.13 LBS					
HARNESS WEIGHT		137.1(LBS)				
RELIABILITY		.6974				
						POWER DISSIPATION 218.7 WATT
						5.70(FT**3)
						104.4(LBS)

MISSION EQUIPMENT

WEIGHT	941.00 LBS				
RELIABILITY		.9000			
					POWER REQUIREMENT 1000.0 WATT
					37.20(FT**3)

VI-257

INTELSAT VI CC1-1-3

* *. SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA

HEATER POWER

HEAT PIPE
HEAT PIPE LENGTH

STORED ENERGY

38.0 (FT**2),

3652.7 (BTU/HR),

0.0 (WATT-IN),

4.9 (FT)

103.0 (BTU)

BATTERY RADIATOR AREA

TOTAL RADIATOR AREA

BATTERY HEATER POWER

TOTAL HEATER POWER

VARIABLE CONDUCTANCE H.P.

AVERAGE HEAT LOAD

.9 (FT**2)

39.0 (FT**2)

90.0 (BTU/HR)

3742.7 (BTU/HR)

792.3 (WATT-IN)

3802.6 (BTU/HR)

THERMAL CONTROL WEIGHT

INSULATION

HEAT PIPES

PHASE CHANGE MATERIAL

RADIATOR (ACTIVE)

UNIT WEIGHT (LBS)

17.5

5.1

2.6

74.4

TOTAL

99.6

IERR

1100001011

STRUCTURES

SKIN THICKNESS

STRINGER NO., THICKNESS, HT.

FRAME NO., THICKNESS, HT.

GRID BEAM THICKNESS

ENDCOVER THICKNESS- FORWARD

EQUIPMENT BAY STRUCTURE WT.

SOLAR ARRAY BOOM AND DRIVE WT.

ADAPTER WEIGHT

163.

5.

.222 (IN),

.030 (IN),

291.7 (LBS)

32.5 (LBS)

108.2 (LBS)

81910.347 (IN),

.147 (IN),

6.244 (IN),

0.000 (IN),

SPACING

CENTER

HEIGHT

AFT

.510 (IN)

.733 (IN)

3.122 (IN)

.030 (IN)

VI-258

INTELSAT VI CC1-1-3

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	3	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	8	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
524	TANK	1	21.6	1.4	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMMD DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	4	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-259

INTELSAT VI CC1-1-3

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	4	16.4	.4	0.0
531	SHUNT REGULATOR	9	4.3	.1	0.0
269	BATTERY	4	71.3	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	941.0
STABILITY AND CONTROL	67.1
AUXILIARY PROPULSION	147.7
DATA PROCESSING	42.4
COMMUNICATIONS	39.1
BATTERIES	285.1
POWER CONTROL	162.0
SOLAR ARRAY	104.4
HARNESS	137.1
STRUCTURE	304.8
SOLAR ARRAY DRIVE	17.3
THERMAL CONTROL	99.6
DRY WEIGHT	2347.6
PROPELLANT	703.9
SATELLITE ADAPTER	108.2

TOTAL LAUNCH WEIGHT 3159.6

VI-260

TDRS/WESTAR CC2-1-1

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 47998. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
125.
8.
4.
1.0000
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 670.92 WATTS
TOTAL SOLAR ARRAY AREA 76.75 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 977.20 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 1668.7 LBS (756.9 KG) LAUNCH WEIGHT = 1732.0 LBS (785.6 KG)
DIMENSIONS
EQUIPMENT BAY 41.3 IN. (1.05 M) 68.9 IN. (1.75 M) 68.9 IN. (1.75 M)
MISSION EQUIPMENT 26.6 IN. (.68 M) 44.3 IN. (1.13 M) 44.3 IN. (1.13 M)
TOTAL SATELLITE 67.9 IN. (1.72 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 296.2 IYY = 1086057.2 IZZ = 1507336.6
X-CG Y-CG Z-CG
CENTER OF GRAVITY 35.4 IN. (.90 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0:
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.2(MO)
RELIABILITY .623

VI-3361

TDRS/WESTAR CC2-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 2 2
WEIGHT 58.40 LBS VOLUME 1.77(FT**3)
RELIABILITY .9856
IERR 10

POWER REQUIREMENT 78.9 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 2 1 2

WEIGHT 368.93 LBS VOLUME 10.45(FT**3)

DRY WEIGHT 98.03(LBS), EXPENDABLE WEIGHT

RELIABILITY .8862

IERR 1

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATT
270.89(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME .39(FT**3)

RELIABILITY .9668

IERR 1

POWER REQUIREMENT 10.9 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 2 2 2 3 2

WEIGHT 35.64 LBS VOLUME 1.05(FT**3)

RELIABILITY .9897

IERR*****

POWER REQUIREMENT 25.5 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 515 269 650 702

EQUIPMENT QUANTITIES 2 9 2 2 1

WEIGHT 232.45 LBS VOLUME 4.56(FT**3)

HARNESS WEIGHT 73.7(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8280

POWER DISSIPATION 113.3 WATT
53.4(LBS)

MISSION EQUIPMENT

WEIGHT 599.00 LBS VOLUME 23.69(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 450.0 WATT

V1-262

TDRS/WESTAR CC2-1-1

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	19.3 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1818.3 (BTU/HR),	TOTAL RADIATOR AREA	20.2 (FT**2,
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.2 (FT)	TOTAL HEATER POWER	1908.3 (BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	687.5 (WATT-IN)
		AVERAGE HEAT LOAD	1927.1 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	UNIT WEIGHT (LBS)
HEAT PIPES	14.2
PHASE CHANGE MATERIAL	4.5
RADIATOR (PASSIVE)	2.6
	12.2

TOTAL	33.5

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.019 (IN)			
STRINGER NO., THICKNESS, HT.	178.		81910.347 (IN),	.410 (IN)
FRAME NO., THICKNESS, HT.	5.		.118 (IN),	.588 (IN)
GRID BEAM THICKNESS	.164 (IN),	SPACING	4.613 (IN),	HEIGHT 2.306 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	145.2 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	24.1 (LBS)			
ADAPTER WEIGHT	63.3 (LBS)			

V1-263

TDRS/WESTAR CC2-1-1

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	1	.7	.0	.3

V1-264

TDRS/WESTAR CC2-1-1

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME

WEIGHT

MISSION EQUIPMENT	599.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	98.0
DATA PROCESSING	21.2
COMMUNICATIONS	35.6
BATTERIES	142.6
POWER CONTROL <i>conv.</i>	89.9
SOLAR ARRAY	53.4
HARNESS	73.7
STRUCTURE	183.7
SOLAR ARRAY DRIVE	8.9
THERMAL CONTROL	33.5
DRY WEIGHT	1397.8
PROPELLANT	270.9
SATELLITE ADAPTER	63.3

TOTAL LAUNCH WEIGHT 1732.0

V1-265

COMSTAR CC2-1-2

* * * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - DUAL SPIN

POINTING ACCURACY = .350000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 47286. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 766.92 WATTS

TOTAL SOLAR ARRAY AREA 322.62 SQ FT

✓ INSTALLED BATTERY CAPACITY 66.00 AMP-HR

✓ BEGINNING OF LIFE POWER 1043.60 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1954.5 LBS (886.5 KG)

LAUNCH WEIGHT = 2043.1 LBS (926.7 KG)

DIMENSIONS LENGTH

HEIGHT

EQUIPMENT BAY 123.2 IN. (3.13 M)

120.0 IN. (3.05 M)

120.0 IN. (3.05 M)

MISSION EQUIPMENT 20.0 IN. (.51 M)

33.3 IN. (.85 M)

33.3 IN. (.85 M)

TOTAL SATELLITE 143.2 IN. (3.64 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

708.9 IYY = 6286578.0

IZZ = 6286578.0

CENTER OF GRAVITY 81.9 IN. (2.08 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

✓ APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 84.0 (MO)

MEAN MISSION DURATION 66.13 (MO)

RELIABILITY .503

V1-266

COMSTAR CC2-1-2

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

✓ CONFIGURATION - - DUAL SPIN

EQUIPMENT CODE IDENTIFIER	101	203	303	403	503	603	703	806	1413	
EQUIPMENT QUANTITIES	1	1	2	2	3	2	2	3	1	
WEIGHT	171.60 LBS									
RELIABILITY		.8237								
IERR	0									
VOLUME					4.86 (FT**3)					
POWER REQUIREMENT										76.7 WATTS

AUXILIARY PROPULSION

✓ CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	906	1003	499	203	1124	524	701	1203	603
EQUIPMENT QUANTITIES	6	2	5	9	2	1	3	1	2	1	1
WEIGHT	372.90 LBS										
DRY WEIGHT	95.40 (LBS)										
RELIABILITY		.9104									
IERR	.11										
VOLUME					11.08 (FT**3)						
EXPENDABLE WEIGHT								277.51 (LBS)			
POWER REQUIREMENT											.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

✓ CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	406				
EQUIPMENT QUANTITIES	2	2				
WEIGHT	39.86 LBS					
RELIABILITY		.9951				
IERR	1					
VOLUME			.56 (FT**3)			
POWER REQUIREMENT						8.5 WATTS

COMMUNICATIONS

✓ CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	206	103	336	401	503	618
EQUIPMENT QUANTITIES	1	2	2	2	3	2
WEIGHT	25.84 LBS					
RELIABILITY		.9739				
IERR	*****					
VOLUME					.47 (FT**3)	
POWER REQUIREMENT						77.7 WATTS

ELECTRICAL POWER

✓ CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	112	260	389	1202		
EQUIPMENT QUANTITIES	10	2	3	2		
WEIGHT	174.04 LBS					
HARNESS WEIGHT		108.9 (LBS)				
RELIABILITY		.7698				
VOLUME					1.52 (FT**3)	
SOLAR ARRAY WEIGHT						158.6 (LBS)
POWER DISSIPATION						61.2 WATTS

MISSION EQUIPMENT

WEIGHT	254.00 LBS					
RELIABILITY		.9000				
VOLUME			10.05 (FT**3)			
POWER REQUIREMENT						420.0 WATTS

VI-267

COMSTAR CC2-1-2

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	17.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1433.6 (BTU/HR),	TOTAL RADIATOR AREA	18.3 (FT**2)
HEAT PIPE	62635.1 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	9.0 (FT)	TOTAL HEATER POWER	1548.5 (BTU/HR)
STORED ENERGY	125.8 (BTU)	VARIABLE CONDUCTANCE H.P.	1852.7 (WATT-IN)
		AVERAGE HEAT LOAD	1988.6 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	41.5
HEAT PIPES	9.4
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	10.9

TOTAL	64.9

IERR 11C0010111

STRUCTURES

SKIN THICKNESS	.021 (IN)			
STRINGER NO., THICKNESS, HT.	218. ,	819	10.347 (IN),	.580 (IN)
FRAME NO., THICKNESS, HT.	8. ,		.167 (IN),	.833 (IN)
GRID BEAM THICKNESS	.160 (IN),	SPACING	4.510 (IN),	2.255 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	235.13 (LBS)			
SOLAR ARRAY BOOM AND CRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	88.6 (LBS)			

V1-268

COMSTAR CC2-1-2

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.6	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	ROTATION DAMPER	2	2.6	.3	0.0
503	GIMBAL ELECTRONICS	3	6.3	.3	31.6
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
703	PTAXIAL DRIVE	2	14.3	.5	28.0
806	EARTH SENSOR ASSY	3	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓829	THRUSTER	6	.6	.0	0.0
✓834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	3	11.5	2.4	0.0
524	TANK	1	21.6	1.4	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMM DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
103	PASEBND ASSY UNIT	2	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	2	1.5	.0	0.0

VI-269

all

COMSTAR CG2-1-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	10	1.4	.0	0.0
260	BATTERY	2	60.7	.3	0.0
389	BATTERY CHARGER	3	5.3	.1	0.0
1202	POWER CONTROL	2	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	254.0
STABILITY AND CONTROL	155.9
AUXILIARY PROPULSION	95.4
DATA PROCESSING	39.9
COMMUNICATIONS	25.8
BATTERIES	121.4
POWER CONTROL	52.6
CONVERTERS	15.9
SOLAR ARRAY	158.6
HARNESS	108.9
STRUCTURE	583.6
THERMAL CONTROL	64.9
OFF-WEIGHT	1676.9
PROPELLANT	277.5
SATELLITE ADAPTER	88.6

TOTAL LAUNCH WEIGHT 2043.1

VI-270

CCMSTAR F/D CC2-1-3 , -10,12

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 124734.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
125.	0.
8.	0.
4.	0.
1.0000.	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 1295.56 WATTS
TOTAL SOLAR ARRAY AREA 149.88 SQ FT
INSTALLED BATTERY CAPACITY 200.00 AMP-HR
BEGINNING OF LIFE POWER 1908.39 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 3116.7 LBS (1413.7 KG) LAUNCH WEIGHT = 3227.2 LBS (1463.8 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH	
EQUIPMENT BAY	47.4 IN.(1.20 M)	78.9 IN.(2.00 M)	78.9 IN.(2.00 M)		
MISSION EQUIPMENT	31.5 IN.(.80 M)	52.5 IN.(1.33 M)	52.5 IN.(1.33 M)		
TOTAL SATELLITE	78.9 IN.(2.00 M)				

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 855.1 IYY = 2667838.0 IZZ = 4272343.2

CENTER OF GRAVITY		X-CG	Y-CG	Z-CG
39.1 IN.(.99 M)	0.0 IN.(0.00 M)	0.0 IN.(0.00 M)	0.0 IN.(0.00 M)	

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 84.0(MO)
MEAN MISSION DURATION 70.1(MO)
RELIABILITY .501

V1-271

CONSTAR F/O CC2-1-3, -10, -12

* * * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303
EQUIPMENT QUANTITIES 3 3 2 2
WEIGHT 67.10 LBS VOLUME 2.06(FT**3)
RELIABILITY .9937
IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130
EQUIPMENT QUANTITIES 18 8 5 9 2 1 4
WEIGHT 851.66 LBS VOLUME 17.81(FT**3)
DRY WEIGHT 147.67(LBS), EXPENDABLE WEIGHT
RELIABILITY .8103
IERR 1

524 701 1203 603
1 2 1 1
POWER REQUIREMENT WATTS
703.99(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 2 2
WEIGHT 42.36 LBS VOLUME .78(FT**3)
RELIABILITY .9990
IERR 1

POWER REQUIREMENT 10.3 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605
EQUIPMENT QUANTITIES 1 3 2 2 4 2
WEIGHT 39.14 LBS VOLUME 1.09(FT**3)
RELIABILITY .9928
IERR*****

POWER REQUIREMENT 25.9 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 531 269 650 702
EQUIPMENT QUANTITIES 4 9 4 4 2
WEIGHT 447.13 LBS VOLUME 5.70(FT**3)
HARNESS WEIGHT 140.4(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .6974

POWER DISSIPATION 218.7 WATTS
104.4(LBS)

MISSION EQUIPMENT

WEIGHT 1000.00 LBS VOLUME 39.53(FT**3)
LIABILITY .9000

POWER REQUIREMENT 1000.0 WATTS

V1-272

CCMSTAR F/O CC2-1-3, -10, -12

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	38.0 (FT**2),	BATTERY RADIATOR AREA	39.0 (FT**2)
HEATER POWER	3652.7 (BTU/HR),	TOTAL RADIATOR AREA	90.0 (BTU/HR)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	3742.7 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	798.7 (WATT-IN)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	3802.6 (BTU/HR)
		AVERAGE HEAT LOAD	

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	17.6
HEAT PIPES	5.2
PHASE CHANGE MATERIAL	2.6
RADIATOR (ACTIVE)	74.4
TOTAL	99.7

IERR 1100001011

STRUCTURES

SKIN THICKNESS	.025 (IN)		
STRINGER NO., THICKNESS, HT.	163.	81910.347 (IN),	.513 (IN)
FRAME NO., THICKNESS, HT.	5.	.147 (IN),	.737 (IN)
GRID BEAM THICKNESS	.224 (IN),	SPACING 6.310 (IN),	HEIGHT 3.155 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	291.7 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	32.9 (LBS)		
ADAPTER WEIGHT	110.4 (LBS)		

V1-273

COMSTAR F/O CC2-1-3, -10, -12

* * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	3	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	8	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
524	TANK	1	21.6	1.4	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMM DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	4	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-274

CCNSTAR F/O CC2-1-3, -10, -12

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	4	16.4	.4	0.0
531	SHUNT REGULATOR	9	4.3	.1	0.0
269	BATTERY	4	71.3	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTROL	67.1
AUXILIARY PROPULSION	147.7
DATA PROCESSING	42.4
COMMUNICATIONS	39.1
BATTERIES	285.1
POWER CONTROL	162.0
SOLAR ARRAY	104.4
HARNES	140.4
STRUCTURE	307.5
SOLAR ARRAY DRIVE	17.3
THERMAL CONTROL	99.7
DRY WEIGHT	2412.8
PROPELLANT	704.0
SATELLITE ADAPTER	110.4

TOTAL LAUNCH WEIGHT 3227.2

V1-275

WESTAR CC2-1-4

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPELLSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 25784. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	).
.1250	.0000
64.	).

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 262.25 WATTS
TOTAL SOLAR ARRAY AREA 100.08 SQ FT
INSTALLED BATTERY CAPACITY 22.00 AMP-HR
BEGINNING OF LIFE POWER 352.86 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1068.4 LBS (484.6 KG)

LAUNCH WEIGHT = 1114.0 LBS (505.3 KG)

DIMENSIONS LENGTH

HEIGHT WIDTH

EQUIPMENT BAY 54.8 IN. (1.39 M)

91.3 IN. (2.32 M)

91.3 IN. (2.32 M)

MISSION EQUIPMENT 20.9 IN. (.53 M)

34.8 IN. (.88 M)

34.8 IN. (.88 M)

TOTAL SATELLITE 75.0 IN. (1.92 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

233.4 IYY = 1094196.0

IZZ = 1094196.0

CENTER OF GRAVITY 42.6 IN. (1.08 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0

MISSION LIFETIME 60.0 (MO)

MEAN MISSION DURATION 50.5 (MO)

RELIABILITY .1602

VI-276

WESTAR CC2-1-4

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

✓CONFIGURATION - - SPIN CONTROL
EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3) POWER REQUIREMENT 10.4 WATTS
RELIABILITY .9051
IERR 0

AUXILIARY PROPULSION

✓CONFIGURATION - - MONOPROPELLANT
EQUIPMENT CODE IDENTIFIER 834 834 906 1003 459 203 1118 518 701 1203 603
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1
WEIGHT 223.33 LBS VOLUME 5.72(FT**3) POWER REQUIREMENT 1.0 WATTS
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 154.99(LBS)
RELIABILITY .8257
IERR 11

DATA PROCESSING AND INSTRUMENTATION

✓CONFIGURATION - - SPECIAL PURPOSE PPROCESSOR (DTU)
EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3) POWER REQUIREMENT 10.5 WATTS
RELIABILITY .9668
IERR 1

COMMUNICATIONS

✓CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3) POWER REQUIREMENT 19.5 WATTS
RELIABILITY .9601
IERR*****

ELECTRICAL POWER

✓CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
EQUIPMENT CODE IDENTIFIER 103 218 306 1202
EQUIPMENT QUANTITIES 7 2 2 1
WEIGHT 108.60 LBS VOLUME 1.97(FT**3) POWER DISSIPATION 20.9 WATTS
HARNESS WEIGHT 47.8(LBS), SOLAR ARRAY WEIGHT 53.6(LBS)
RELIABILITY .9649

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48(FT**3) POWER REQUIREMENT 208.0 WATTS
RELIABILITY .9000

VI-277

WESTAR CC2-1-4

***** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	7.3 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	694.5 (BTU/HR),	TOTAL RADIATOR AREA	8.5 (FT**2)
HEAT PIPE	14155.9 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.7 (FT)	TOTAL HEATER POWER	809.4 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	978.7 (WATT-IN)
		AVERAGE HEAT LOAD	850.8 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	19.1
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	4.6
TOTAL	30.4

IERR 11C0010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
SPRINGER NO., THICKNESS, HT.	235.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.410 (IN)
GRID BEAM THICKNESS	.124 (IN),	.118 (IN),	.588 (IN)
ENCLOSER THICKNESS- FORWARD	.030 (IN),	3.483 (IN),	HEIGHT 1.742 (IN)
EQUIPMENT BAY STRUCTURE WT.	113.9 (LBS)	0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	45.7 (LBS)		

V1-278

WESTAR CC2-1-4

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	MUTATION DAMPER	1	2.8	.3	0.0
603	CONTRDL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓834	THRUSTER	6	.7	.0	.1
✓834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓203	DIGITAL TELEMETRY	1	8.9	.2	3.0
✓403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-279

WESTAR CC2-1-4

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
✓218	BATTERY	2	21.0	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	42.0
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	53.6
HARNESS	47.8
STRUCTURE	232.6
THERMAL CONTROL	30.4
DRY WEIGHT	913.4
PROPELLANT	155.0
SATELLITE ADAPTER	45.7

TOTAL LAUNCH WEIGHT	1114.0

VI-280

RCA SATCOM CC2-1-5

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 38343.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
125.	0.
8.	0.
4.	0.
1.0000	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 645.92 WATTS
TOTAL SOLAR ARRAY AREA 73.89 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HR
BEGINNING OF LIFE POWER 940.79 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1192.5 LBS (540.9 KG)

LAUNCH WEIGHT = 1237.8 LBS (561.5 KG)

DIMENSIONS

EQUIPMENT BAY 41.1 IN.(1.04 M)
MISSION EQUIPMENT 19.2 IN.(.49 M)
TOTAL SATELLITE 60.3 IN.(1.53 M)

HEIGHT 68.5 IN.(1.74 M)
WIDTH 68.5 IN.(1.74 M)
32.0 IN.(.81 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

230.7 IYY = 670587.1 IZZ = 1063884.3

CENTER OF GRAVITY 29.3 IN.(.74 M)

Y-CG 0.0 IN.(0.00 M)
Z-CG 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.2(MO)
RELIABILITY .623

VI-281

RCA SATCOM CC2-1-5

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 2 2

WEIGHT 58.40 LBS VOLUME 1.77(FT**3)

RELIABILITY

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603

EQUIPMENT QUANTITIES 18 6 5 9 2 1 2 1 2 1 1

WEIGHT 312.89 LBS VOLUME 10.15(FT**3) POWER REQUIREMENT .3 WATTS

DRY WEIGHT 95.03(LBS), EXPENDABLE WEIGHT 217.86(LBS)

RELIABILITY

IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME

RELIABILITY

IERR 1

.39(FT**3) POWER REQUIREMENT 10.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 2 2 2 3 2

WEIGHT 35.64 LBS VOLUME 1.05(FT**3) POWER REQUIREMENT 25.5 WATT

RELIABILITY

IERR*****

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 515 269 650 702

EQUIPMENT QUANTITIES 2 9 2 2 1

WEIGHT 232.45 LBS VOLUME 4.56(FT**3) POWER DISSIPATION 109.1 WATTS

HARNESS WEIGHT 56.3(LBS), SOLAR ARRAY WEIGHT 51.5(LBS)

RELIABILITY

IERR*****

MISSION EQUIPMENT

WEIGHT 225.00 LBS VOLUME

RELIABILITY

.9000

8.91(FT**3)

POWER REQUIREMENT 425.0 WATTS

V1-282

RCA SATCOM CC2-1-5

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	18.4 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1735.0 (BTU/HR),	TOTAL RADIATOR AREA	19.4 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	1825.0 (BTU/HR)
STORED ENERGY	111.0 (BTU)	VARIABLE CONDUCTANCE H.P.	610.4 (WATT-IN)
		AVERAGE HEAT LOAD	1841.9 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	13.0
HEAT PIPES	4.0
PHASE CHANGE MATERIAL	2.8
RADIATOR (PASSIVE)	11.7
TOTAL	31.4

IERR 1100001011

STRUCTURES

SKIN THICKNESS	.016 (IN)		
STRINGER NO., THICKNESS, HT.	192.	81910.347 (IN),	.376 (IN)
FRAME NO., THICKNESS, HT.	5.	.108 (IN),	.539 (IN)
GRID BEAM THICKNESS	.138 (IN),	SPACING 3.898 (IN),	HEIGHT 1.949 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	133.9 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	23.7 (LBS)		
ADAPTER WEIGHT	45.3 (LBS)		

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RCA SATCOM CC2-1-5

*** ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

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RCA SATCOM CC2-1-5

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	225.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	95.0
DATA PROCESSING	21.2
COMMUNICATIONS	35.6
BATTERIES	142.6
POWER CONTROL	89.9
SOLAR ARRAY	51.5
HARNES	56.3
STRUCTURE	159.2
SOLAR ARRAY DRIVE	8.5
THERMAL CONTROL	31.4
DRY WEIGHT	974.6
PROPELLANT	217.9
SATELLITE ADAPTER	45.3

TOTAL LAUNCH WEIGHT 1237.8

V1-285

RCA F/D CC2-1-6

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 40745.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER
CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 659.02 WATTS
TOTAL SOLAR ARRAY AREA 75.39 SQ FT
INSTALLED BATTERY CAPACITY 100.00 AMP-HI
BEGINNING OF LIFE POWER 939.87 WATTS

VEHICLE SIZING
CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 1186.5 LBS (538.2 KG) LAUNCH WEIGHT = 1231.2 LBS (558.5 KG)
DIMENSIONS
EQUIPMENT BAY 39.2 IN. (.99 M) 65.3 IN. (1.66 M) 65.3 IN. (1.66 M)
MISSION EQUIPMENT 19.9 IN. (.50 M) 33.1 IN. (.84 M) 33.1 IN. (.84 M)
TOTAL SATELLITE 59.0 IN. (1.50 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 217.9 IYY = 634022.5 IZZ = 1026466.8
CENTER OF GRAVITY 28.7 IN. (.73 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
CONFIGURATION -- SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 49.8(MO)
RELIABILITY .612

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RCA F/O CC2-1-6

* * SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24(FT**3)

RELIABILITY .9418

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 2 1 2

WEIGHT 326.54 LBS VOLUME 10.15(FT**3)

DRY WEIGHT 95.03(LBS), EXPENDABLE WEIGHT

RELIABILITY .8865

IERR 11

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
231.51(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME

RELIABILITY .9668 .39(FT**3)

IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 2 2 1 3 2

WEIGHT 31.72 LBS VOLUME 1.00(FT**3)

RELIABILITY .9770

IERR*****

POWER REQUIREMENT 25.9 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 515 269 650 702

EQUIPMENT QUANTITIES 2 9 2 2 1

WEIGHT 224.69 LBS VOLUME 2.73(FT**3)

HARNESS WEIGHT 50.4(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8626

POWER DISSIPATION 111.3 WATTS
52.5(LBS)

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 60.0 WATTS

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RCA F/O CC2-1-6

* *. SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	19.6 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1851.7 (BTU/HR),	TOTAL RADIATOR AREA	20.5 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	1941.7 (BTU/HR)
STORED ENERGY	111.0 (BTU)	VARIABLE CONDUCTANCE H.P.	597.8 (WATT-IN)
		AVERAGE HEAT LOAD	1961.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	12.4
HEAT PIPES	3.9
PHASE CHANGE MATERIAL	2.8
RADIATOR (PASSIVE)	12.4

TOTAL	31.5

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.016 (IN)		
STRINGER NO., THICKNESS, HT.	188. ,	81910.347 (IN),	.367 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.105 (IN),	.527 (IN)
GRID BEAM THICKNESS	.139 (IN),	SPACING 3.905 (IN),	HEIGHT 1.952 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	131.2 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	23.9 (LBS)		
ADAPTER WEIGHT	44.7 (LBS)		

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RCA F/D CC2-1-6

*** ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

RCA F/O CC2-1-6

♦ ♦ ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
IDENT	TYPE				
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	95.0
DATA PROCESSING	21.2
COMMUNICATIONS	31.7
BATTERIES	142.6
POWER CONTROL	82.1
SOLAR ARRAY	52.5
HARNESS	50.4
STRUCTURE	146.2
SOLAR ARRAY DRIVE	8.7
THERMAL CONTROL	31.5
DRY WEIGHT	955.0
PROPELLANT	231.5
SATELLITE ADAPTER	44.7

TOTAL LAUNCH WEIGHT 1231.2

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MARISAT F/O CC2-1-7

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .600000(DEG.)

AUXILIARY PROPULSION
CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE
NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA	MISSION EQUIPMENT DATA
32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
1250	0.0000
64.	0.

COMMUNICATIONS
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER
CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 298.25 WATTS
TOTAL SOLAR ARRAY AREA 124.06 SQ FT
INSTALLED BATTERY CAPACITY 24.00 AMP-HR
BEGINNING OF LIFE POWER 401.30 WATTS

VEHICLE SIZING
CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 957.6 LBS (434.4 KG) LAUNCH WEIGHT = 1000.0 LBS (453.6 KI
DIMENSIONS
EQUIPMENT BAY 58.4 IN.(1.48 M) HEIGHT 97.4 IN.(2.47 M) WIDTH 97.4 IN.(2.47 M)
MISSION EQUIPMENT 17.3 IN.(.44 M) 28.8 IN.(.73 M) 28.8 IN.(.73 M)
TOTAL SATELLITE 75.7 IN.(1.92 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 234.8 IYY = 1070904.4 IZZ = 1070904.4
X-CG Y-CG Z-CG
CENTER OF GRAVITY 41.3 IN.(1.05 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY
CONFIGURATION -- SINGLE SYSTEM
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.5(MO)
RELIABILITY .603

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MARISAT F/O CC2-1-7

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

✓CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3)
RELIABILITY .9051
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

✓CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8261
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

✓CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

✓CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

✓CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 221 306 1202
EQUIPMENT QUANTITIES 7 2 2 1
WEIGHT 117.20 LBS VOLUME 2.03(FT**3)
HARNESS WEIGHT 43.5(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9649

POWER DISSIPATION 23.8 WATTS
61.0(LBS)

MISSION EQUIPMENT

WEIGHT 165.00 LBS VOLUME 6.53(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 244.0 WATTS

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MARISAT F/D CC2-1-7

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL
RADIATOR AREA

8.3 (FT**2),

HEATER POWER

800.0 (BTU/HR),

HEAT PIPE

16212.2 (WATT-IN),

HEAT PIPE LENGTH

4.7 (FT)

STORED ENERGY

72.1 (BTU)

BATTERY RADIATOR AREA

.8 (FT**2)

TOTAL RADIATOR AREA

9.2 (FT**2)

BATTERY HEATER POWER

63.6 (BTU/HR)

TOTAL HEATER POWER

863.6 (BTU/HR)

VARIABLE CONDUCTANCE H.P.

979.5 (WATT-IN)

AVERAGE HEAT LOAD

973.6 (BTU/HR)

THERMAL CONTROL WEIGHT

UNIT WEIGHT (LBS)

INSULATION

20.1

HEAT PIPES

5.0

PHASE CHANGE MATERIAL

1.8

RADIATOR (PASSIVE)

5.3

TOTAL

32.1

IERR

1100010111

STRUCTURES

SKIN THICKNESS .013 (IN)

STRINGER NO., THICKNESS, HT.

252.

FRAME NO., THICKNESS, HT.

5.

GRID BEAM THICKNESS

.115 (IN)

ENDCOVER THICKNESS- FORWARD

.030 (IN)

EQUIPMENT BAY STRUCTURE WT.

112.2 (LBS)

SOLAR ARRAY BOOM AND DRIVE WT.

0.0 (LBS)

ADAPTER WEIGHT

42.4 (LBS)

81910.347 (IN),

.407 (IN)

.117 (IN),

.585 (IN)

SPACING 3.228 (IN),

1.614 (IN)

CENTER 0.000 (IN),

HEIGHT

.030 (IN)

AFT

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MARISAT F/U CC2-1-7

* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTCNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIFLEXER	1	3.1	.0	1.0

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MARISAT F/O CC2-1-7

* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
✓221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	165.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	50.6
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	61.0
HARNESS	43.5
STRUCTURE	248.3
THERMAL CONTROL	32.1
DRY WEIGHT	817.4
PROPELLANT	140.2
SATELLITE ADAPTER	42.4

TOTAL LAUNCH WEIGHT 1000.0

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AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .40000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 23324 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.1 (IPS)

CDPT TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
4.1250	0.0000
4.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 437.75 WATTS
TOTAL SOLAR ARRAY AREA 182.09 SQ FT
INSTALLED BATTERY CAPACITY 36.00 AMP-HR
BEGINNING OF LIFE POWER 588.99 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1293.5 LBS (586.7 KG) LAUNCH WEIGHT = 1355.8 LBS (615.0 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH	
EQUIPMENT BAY	70.8 IN. (1.80 M)	117.9 IN. (3.00 M)	117.9 IN. (3.00 M)		
MISSION EQUIPMENT	19.9 IN. (.50 M)	33.1 IN. (.84 M)	33.1 IN. (.84 M)		
TOTAL SATELLITE	90.6 IN. (2.30 M)				

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 425.8 IYY = 2005003.2 IZZ = 2005003.2

CENTER OF GRAVITY 51.9 IN. (1.32 M) X-CG Y-CG Z-CG
0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0

MISSION LIFETIME 60.0 (MO)

MEAN MISSION DURATION 51.0 (MO)

RELIABILITY .615

768-1A

AM SAT CORP (ASC) CC2-1-8, CC 3-1-23, CC 3-1-40

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

✓CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80 (FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATT

AUXILIARY PROPULSION

✓CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER J34 834 906 1003 499 203 1118 518 701 1203 603
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1
WEIGHT 208.54 LBS VOLUME 5.72 (FT**3)
DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT 140.20 (LBS)
RELIABILITY .8261
IERR 11

POWER REQUIREMENT 1.0 WATT

DATA PROCESSING AND INSTRUMENTATION

✓CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39 (FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATT

COMMUNICATIONS

✓CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92 (FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATT

ELECTRICAL POWER

✓CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 236 315 1202
EQUIPMENT QUANTITIES 10 2 2 1
WEIGHT 156.05 LBS VOLUME 2.95 (FT**3)
HARNESS WEIGHT 56.8 (LBS), SOLAR ARRAY WEIGHT 89.5 (LBS)
RELIABILITY .9269

POWER DISSIPATION 34.9 WATT

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 380.0 WATT

VI-297

AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	12.3 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1198.9(BTU/HR),	TOTAL RADIATOR AREA	13.5 (FT**2)
HEAT PIPE	26651.8(WATT-IN),	BATTERY HEATER POWER	115.0(BTU/HR)
HEAT PIPE LENGTH	5.7 (FT)	TOTAL HEATER POWER	1313.9(BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1172.6(WATT-IN)
		AVERAGE HEAT LOAD	1437.3 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	27.3
HEAT PIPES	5.9
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	7.8
TOTAL	42.9

IERR 11CG010111

STRUCTURES

SKIN THICKNESS	.014 (IN)		
SPRINGER NO., THICKNESS, HT.	263.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.473 (IN)
GRID BEAM THICKNESS	.128 (IN),	.136 (IN),	.679 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	3.592 (IN),	HEIGHT 1.796 (IN)
EQUIPMENT BAY STRUCTURE WT.	125.3 (LBS)	0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND CRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	62.2 (LBS)		

V1-298

AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.6	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMODO DECOD+DIST	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-299

AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
✓236	BATTERY	2	40.2	.4	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	80.5
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	89.5
HARNESS	56.8
STRUCTURE	398.5
THERMAL CONTROL	42.9
DRY WEIGHT	1153.3
PROPELLANT	140.2
SATELLITE ADAPTER	62.2

TOTAL LAUNCH WEIGHT 1355.8

VI-300

SAT BUS SYST (SBS) CC2-1-9

* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
16.	0.
64.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 357.75 WATTS

TOTAL SOLAR ARRAY AREA 150.75 SQ FT

INSTALLED BATTERY CAPACITY 30.00 AMP-HR

BEGINNING OF LIFE POWER 487.63 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1111.1 LBS (504.0 KG)

DIMENSIONS LENGTH

EQUIPMENT BAY 64.4 IN. (1.64 M)

MISSION EQUIPMENT 18.4 IN. (.47 M)

TOTAL SATELLITE 82.8 IN. (2.10 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

316.8 IYY = 1467168.7

IZZ = 1467168.7

CENTER OF GRAVITY 46.2 IN. (1.17 M)

Y-CG 0.0 IN. (0.00 M)

Z-CG 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION

19323.1/19323.1 0.0

MISSION LIFETIME

60.10 (MO)

MEAN MISSION DURATION

51.4 (MO)

RELIABILITY

.626

VI-301

SAT BUS SYST (SBS) CC2-1-9

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

✓ CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80 (FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WAT1

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72 (FT**3)
DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT
RELIABILITY .8259
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WAT1
140.20 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39 (FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WAT1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92 (FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WAT1

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 227 309 1202
EQUIPMENT QUANTITIES 9 2 2 1
WEIGHT 135.72 LBS VOLUME 2.68 (FT**3)
HARNESS WEIGHT 51.2 (LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9437

POWER DISSIPATION 33.6 WAT1
74.1 (LBS)

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 300.0 WAT1

VI-302

SAT BUS SYST (SBS) CC2-1-9

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	10.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	964.3 (BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	21216.2 (WATT-IN),	BATTERY HEATER POWER	85.1 (BTU/HR)
HEAT PIPE LENGTH	5.2 (FT)	TOTAL HEATER POWER	1049.3 (BTU/HR)
STORPED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1071.7 (WATT-IN)
		AVERAGE HEAT LOAD	1164.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	23.4
HEAT PIPES	5.4
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	6.3
TOTAL	36.9

IERR 11C0010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	257.	81910.347 (IN),	.439 (IN)
FRAME NO., THICKNESS, HT.	5.	.126 (IN),	.631 (IN)
GRID BEAM THICKNESS	.121 (IN),	SPACING 3.404 (IN),	HEIGHT 1.702 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	119.3 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	51.3 (LBS)		

V1-303

SAT BUS SYST (SBS) CC2-1-9

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION GAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	P/ASEND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-304

SAT BUS SYST (SBS) CC2-1-9

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	9	4.2	.1	0.0
✓227	BATTERY	2	30.4	.4	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	60.7
POWER CONTROL	75.0
CONVERTERS	15.9
SOLAR ARRAY	74.1
HARNESS	51.2
STRUCTURE	315.4
THERMAL CONTROL	36.9
DRY WEIGHT	970.9
PROPELLANT	140.2
SATELLITE ADAPTER	51.3

TOTAL LAUNCH WEIGHT 1162.4

✓1-305

PUBLIC SERVICE CC2-1-11

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - DUAL SPIN
POINTING ACCURACY = .350000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 33126. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

64.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 885.84 WATTS
TOTAL SOLAR ARRAY AREA 368.47 SQ FT
INSTALLED BATTERY CAPACITY 72.00 AMP-HR
BEGINNING OF LIFE POWER 1191.90 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 2320.3 LBS (1052.5 KG) LAUNCH WEIGHT = 2425.8 LBS (1100.3 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 140.7 IN. (3.57 M) 120.0 IN. (3.05 M) 120.0 IN. (3.05 M)
MISSION EQUIPMENT 26.6 IN. (.68 M) 44.3 IN. (1.13 M) 44.3 IN. (1.13 M)
TOTAL SATELLITE 167.3 IN. (4.25 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 784.9 IYY = 8908498.2 IZZ = 8908498.2
X-CG Y-CG Z-CG
CENTER OF GRAVITY 107.8 IN. (2.74 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0 (MO)
MEAN MISSION DURATION 48.9 (MO)
RELIABILITY .1603

V1-306

PUBLIC SERVICE CC2-1-11

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

✓ CONFIGURATION - - DUAL SPIN

EQUIPMENT CODE IDENTIFIER	101	203	303	403	503	603	703	806	1413	
EQUIPMENT QUANTITIES	1	1	2	2	2	2	2	2	1	
WEIGHT	161.50 LBS									
VOLUME					4.44(FT**3)					
POWER REQUIREMENT										76.7 WATT

RELIABILITY .8575

IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	906	1003	499	203	1124	518	701	1203	603
EQUIPMENT QUANTITIES	6	2	5	9	2	1	2	1	2	1	1
WEIGHT	269.52 LBS										
VOLUME					8.21(FT**3)						
POWER REQUIREMENT											.3 WATT

EXPENDABLE WEIGHT 194.41(LBS)

RELIABILITY .9314

IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	406					
EQUIPMENT QUANTITIES	1	2					
WEIGHT	30.93 LBS						
VOLUME		.40(FT**3)					
POWER REQUIREMENT							8.5 WATT

RELIABILITY .9810

IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	206	103	336	401	503	618
EQUIPMENT QUANTITIES	1	1	2	2	3	2
WEIGHT	23.84 LBS					
VOLUME			.43(FT**3)			
POWER REQUIREMENT						77.7 WATT

RELIABILITY .9818

IERR*****

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	112	263	389	1202
EQUIPMENT QUANTITIES	12	2	3	1
WEIGHT	170.20 LBS			
VOLUME			1.73(FT**3)	
POWER DISSIPATION				70.7 WATT

SOLAR ARRAY WEIGHT 181.1(LBS)

RELIABILITY .8711

MISSION EQUIPMENT

WEIGHT	600.00 LBS					
VOLUME		23.73(FT**3)				
POWER REQUIREMENT						575.0 WATT

RELIABILITY .9000

VI-307

PUBLIC SERVICE CC2-1-11

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	21.7 (FT**2),	BATTERY RADIATOR AREA	2.6 (FT**2)
HEATER POWER	1891.4 (BTU/HR),	TOTAL RADIATOR AREA	22.3 (FT**2)
HEAT PIPE	92642.5 (WATT-IN),	BATTERY HEATER POWER	42.6 (BTU/HR)
HEAT PIPE LENGTH	10.5 (FT)	TOTAL HEATER POWER	1934.0 (BTU/HR)
STORED ENERGY	125.8 (BTU)	VARIABLE CONDUCTANCE H.P.	2164.9 (WATT-IN)
		AVERAGE HEAT LOAD	2517.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		47.8
HEAT PIPES		11.0
PHASE CHANGE MATERIAL		3.1
RADIATOR (ACTIVE)		51.0

TOTAL		113.0

IERR 11C0010111

STRUCTURES				
SKIN THICKNESS	.024 (IN)			
STRINGER NO., THICKNESS, HT.	206.		81910.347 (IN),	.614 (IN)
FRAME NO., THICKNESS, HT.	9		.176 (IN),	.881 (IN)
GRID BEAM THICKNESS	.171 (IN),	SPACING	4.815 (IN),	HEIGHT 2.407 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	201.18 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.10 (LBS)			
ADAPTER WEIGHT	105.15 (LBS)			

V1-308

PUBLIC SERVICE CC2-1-11

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.8	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	MUTATION DAMPER	2	2.8	.3	0.0
503	GIMBAL ELECTRONICS	2	6.3	.3	31.6
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
703	BIAXIAL DRIVE	2	14.3	.5	28.0
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	2	11.5	2.4	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMDC DECOD+DISTK	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	2	1.5	.0	0.0

VI-309

all

PUBLIC SERVICE CC2-1-11

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	12	1.4	.0	0.0
✓263	BATTERY	2	63.3	.5	0.0
389	BATTERY CHARGER	3	5.3	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	145.6
AUXILIARY PROPULSION	75.1
DATA PROCESSING	30.9
COMMUNICATIONS	23.8
BATTERIES	126.5
POWER CONTROL	43.7
CONVERTERS	15.9
SOLAR ARRAY	181.1
HARNESSES	117.6
STRUCTURE	652.7
THERMAL CONTROL	113.0
DRY WEIGHT	2125.9
PROPELLANT	194.4
SATELLITE ADAPTER	105.5

TOTAL LAUNCH WEIGHT 2425.8

VI-310

HI CAP VIDEO BRDCST CC2-1-13

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTRLL

CONFIGURATION - - SPIN CONTROL

POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 24125. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.1 (IPS)

COPT TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
64.	0.0000
1250	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 478.63 WATTS

TOTAL SOLAR ARRAY AREA 199.09 SQ FT

INSTALLED BATTERY CAPACITY 40.00 AMP-HR

BEGINNING OF LIFE POWER 644.00 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1372.6 LBS (622.6 KG) LAUNCH WEIGHT = 1439.0 LBS (652.7 K)

DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 76.0 IN. (1.93 M) 120.0 IN. (3.05 M) 120.0 IN. (3.05 M)

MISSION EQUIPMENT 20.4 IN. (.52 M) 34.0 IN. (.86 M) 34.0 IN. (.86 M)

TOTAL SATELLITE 96.4 IN. (2.45 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 465.6 IYY = 2326383.3 IZZ = 2326383.3

CENTER OF GRAVITY 56.0 IN. (1.42 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323.7/19323.7 0.0

MISSION LIFETIME 60.10 (MO)

MEAN MISSION DURATION 50.1 (MO)

RELIABILITY .622

VI-311

HI CAP VIDEO BRDCST CC2-1-13

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80(FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOC PROPELLANT

EQUIPMENT CODE IDENTIFIER 334 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 2 1 2
WEIGHT 217.45 LBS VOLUME 6.12(FT**3)
DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT
RELIABILITY .8986
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATT
145.02(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 3 1
WEIGHT 26.12 LBS VOLUME .94(FT**3)
RELIABILITY .9715
IERR*****

POWER REQUIREMENT 19.5 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 239 315 1202
EQUIPMENT QUANTITIES 10 2 2 1
WEIGHT 163.62 LBS VOLUME 2.59(FT**3)
HARNESS WEIGHT 60.3(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .8520

POWER DISSIPATION 38.2 WATT
97.9(LBS)

MISSION EQUIPMENT

WEIGHT 270.00 LBS VOLUME 10.69(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 420.0 WATT

VI-312

HI CAP VIDEO BRDCST CC2-1-13

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	13.5 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1316.2 (BTU/HR),	TOTAL RADIATOR AREA	14.8 (FT**2)
HEAT PIPE	32377.4 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.0 (FT)	TOTAL HEATER POWER	1440.0 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1247.6 (WATT-IN)
		AVERAGE HEAT LOAD	1573.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	29.2
HEAT PIPES	6.3
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	8.5
TOTAL	45.9

IERR 110010111

STRUCTURES

SKIN THICKNESS	.015 (IN)		
STRINGER NO., THICKNESS, HT.	259. ,	81910.347 (IN),	.487 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.140 (IN),	.700 (IN)
GRID BEAM THICKNESS	.131 (IN),	SPACING 3.689 (IN),	HEIGHT 1.844 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.19 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	6.10 (LBS)		
ADAPTER WEIGHT	66.13 (LBS)		

VI-313

HI CAP VIDEO BRDCST CC2-1-13

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V-314

HI CAP VIDEO BRDCST CC2-1-13

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	PD.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	270.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	97.9
HARNESS	60.3
STRUCTURE	426.7
THERMAL CONTROL	45.9
DPY WEIGHT	1227.6
PROPELLANT	145.0
SATELLITE ADAPTER	66.3

TOTAL LAUNCH WEIGHT 1439.0

VI-315

OTHER US CC2-1-14, 3-1-3, 3-1-4

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = C. (IPS)

CDPT TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 304.25 WATTS
TOTAL SOLAR ARRAY AREA 126.55 SQ FT
INSTALLED BATTERY CAPACITY 24.00 AMP-HR
BEGINNING OF LIFE POWER 409.37 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER
NET SATELLITE WEIGHT = 1012.4 LBS (459.2 KG) LAUNCH WEIGHT = 1057.3 LBS (479.6 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 59.0 IN. (1.50 M) 98.3 IN. (2.50 M) 98.3 IN. (2.50 M)
MISSION EQUIPMENT 18.4 IN. (.47 M) 30.7 IN. (.78 M) 30.7 IN. (.78 M)
TOTAL SATELLITE 77.4 IN. (1.97 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 251.0 IYY = 1156574.4 IZZ = 1156574.4
X-CG Y-CG Z-CG
CENTER OF GRAVITY .42.8 IN. (1.09 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0
MISSION LIFETIME 60.0 (MO)
MEAN MISSION DURATION 50.5 (MO)
RELIABILITY .1602

VI-316

OTHER US CC2-1-14, 3-1-3, 3-1-4

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3)
RELIABILITY .9051
IERR 0

POWER REQUIREMENT 10.4 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 206.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8258
IERR 11

518 701 1203 603
POWER REQUIREMENT 1.0 WATT
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 221 306 1202
EQUIPMENT QUANTITIES 8 2 2 1
WEIGHT 121.40 LBS VOLUME 2.16(FT**3)
HARNESS WEIGHT 46.3(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9644

POWER DISSIPATION 24.3 WATT
62.2(LBS)

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 250.0 WATT

VI-317

OTHER US CC2-1-14, 3-1-3, 3-1-4

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	8.5 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	817.6 (BTU/HR),	TOTAL RADIATOR AREA	.9.3 (FT**2)
HEAT PIPE	16931.0 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	881.2 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1001.9 (WATT-IN)
		AVERAGE HEAT LOAD	994.0 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	20.6
HEAT PIPES	5.1
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	5.4
TOTAL	32.9

IERR 11C0010111

STRUCTURES

SKIN THICKNESS	.013 (IN)		
SPRINGER NO., THICKNESS, HT.	250.		
FRAME NO., THICKNESS, HT.	5.	61910.347 (IN),	.415 (IN)
GRID BEAM THICKNESS	.118 (IN),	.119 (IN),	.596 (IN)
ENCLOSURE THICKNESS- FORWARD	.030 (IN),	3.317 (IN),	1.659 (IN)
EQUIPMENT BAY STRUCTURE WT.	113.3 (LBS)	CENTER	0.000 (IN), AFT
SOLAR ARRAY BOOM AND DRIVE WT.	0.10 (LBS)		.030 (IN)
ADAPTER WEIGHT	44.19 (LBS)		

VI-318

OTHER US CC2-1-14, 3-1-3, 3-1-4

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	MUTATION DAMPER	1	2.6	.3	0.0
603	CONTROL ELECTFNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
490	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-319

OTHER US' CC2-1-14, 3-1-3, 3-1-4

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.6	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	50.6
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	62.2
HARNESS	46.3
STRUCTURE	259.1
THERMAL CONTROL	32.9
DRY WEIGHT	872.2
PROPELLANT	140.2
SATELLITE ADAPTER	44.9

TOTAL LAUNCH WEIGHT 1057.3

V1-320

ARAB COMSAT (ARCOMSAT) CC3-1-1, -1-7, -1-13

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION - - SPIN CONTROL
 POINTING ACCURACY = .400000 (DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION - - MONOPROPELLANT
 TOTAL IMPULSE = 23324. (LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.1 (IPS)
 CDPI TABLE

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA
 32.
 256.
 13.
 8.
 18.
 .1250
 64.

MISSION EQUIPMENT DATA
 0.
 0.
 0.
 0.
 0.
 0.0000
 0.

COMMUNICATIONS
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 309.25 WATTS
 TOTAL SOLAR ARRAY AREA 128.63 SQ FT
 INSTALLED BATTERY CAPACITY 28.00 AMP-HR
 BEGINNING OF LIFE POWER 416.10 WATTS

VEHICLE SIZING
 CONFIGURATION - - CYLINDER
 WET SATELLITE WEIGHT = 1027.2 LBS (465.9 KG) LAUNCH WEIGHT = 1072.9 LBS (486.7 K
 DIMENSIONS LENGTH HEIGHT WIDTH
 EQUIPMENT BAY 59.5 IN. (1.51 M) 99.1 IN. (2.52 M) 99.1 IN. (2.52 M)
 MISSION EQUIPMENT 18.4 IN. (.47 M) 30.7 IN. (.78 M) 30.7 IN. (.78 M)
 TOTAL SATELLITE 77.9 IN. (1.98 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 258.7 IYY = 1190747.5 IZZ = 1190747.5
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 43.0 IN. (1.09 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
 CONFIGURATION - - SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0
 MISSION LIFETIME 60.0 (MO)
 MEAN MISSION DURATION 50.5 (MO)
 RELIABILITY .9602

V1-321

ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-13

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3)
RELIABILITY .9051
IERR 0

POWER REQUIREMENT 10.4 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DAY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8258
IERR 11

518 701 1203 603
POWER REQUIREMENT 1.0 WATT
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 224 306 1202
EQUIPMENT QUANTITIES 0 2 2 1
WEIGHT 128.99 LBS VOLUME 2.21(FT**3)
HARNESS WEIGHT 46.5(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9644

POWER DISSIPATION 24.7 WATT
63.2(LBS)

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 255.0 WATT

VI-322

ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-13

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	8.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	832.3 (BTU/HR),	TOTAL RADIATOR AREA	9.8 (FT**2)
HEAT PIPE	17328.7 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	947.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1008.1 (WATT-IN)
		AVERAGE HEAT LOAD	1011.1 (BTU/HR)

THERMAL CONTROL WEIGHT	
	UNIT WEIGHT (LBS)
INSULATION	20.9
HEAT PIPES	5.1
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	5.5
TOTAL	33.3

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.013 (IN)		
STIFFENER NO., THICKNESS, HT.	250. ,	81910.347 (IN),	.418 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.120 (IN),	.600 (IN)
GRID BEAM THICKNESS	.119 (IN),	SPACING 3.339 (IN),	HEIGHT 1.669 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	115.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	45.7 (LBS)		

V1-323

ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-12

* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-324

ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-13

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	63.2
HARNESS	46.5
STRUCTURE	264.8
THERMAL CONTROL	33.3
DRY WEIGHT	887.0
PROPELLANT	140.2
SATELLITE ADAPTER	45.7

TOTAL LAUNCH WEIGHT 1072.9

V1-325

ARCOMSAT F/O CC3-1-2

* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 357.75 WATTS
TOTAL SOLAR ARRAY AREA 150.75 SQ FT
INSTALLED BATTERY CAPACITY 30.00 AMP-HR
BEGINNING OF LIFE POWER 487.63 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1159.7 LBS (526.0 KG)

LAUNCH WEIGHT = 1213.0 LBS (550.2 KG)

DIMENSIONS

EQUIPMENT BAY 64.4 IN. (1.64 M)
MISSION EQUIPMENT 19.6 IN. (.50 M)
TOTAL SATELLITE 84.0 IN. (2.13 M)

HEIGHT 107.3 IN. (2.73 M)
WIDTH 107.3 IN. (2.73 M)
32.7 IN. (.83 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

329.2 IYY = 1536348.4 IZZ = 1536348.4

CENTER OF GRAVITY 47.5 IN. (1.21 M)

Y-CG 0.0 IN. (0.00 M)
Z-CG 0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323.1/19323.7 0.0

MISSION LIFETIME 60.0 (MO)

MEAN MISSION DURATION 51.4 (MO)

RELIABILITY .626

VI-326

ARCOMSAT F/O CC3-1-2

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413
EQUIPMENT QUANTITIES	1	1	1	2		
WEIGHT	42.50 LBS				1.80 (FT**3)	
RELIABILITY		.9618				
IERR	0					

POWER REQUIREMENT 10.4 WATT

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118
EQUIPMENT QUANTITIES	6	2	5	9	1	1	2
WEIGHT	206.54 LBS				5.72 (FT**3)		
DRY WEIGHT	68.33 (LBS)						
RELIABILITY		.8259					
IERR	11						

518	701	1203	603
1	2	1	1
POWER REQUIREMENT 1.0 WATT			
140.20 (LBS)			

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403
EQUIPMENT QUANTITIES	1	1
WEIGHT	21.18 LBS	
RELIABILITY		.9668
IERR	1	

VOLUME	.39 (FT**3)	POWER REQUIREMENT	10.5 WATT
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COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603
EQUIPMENT QUANTITIES	1	1	2	1	2	1
WEIGHT	24.62 LBS					
RELIABILITY		.9601				
IERR	*****					

VOLUME	.92 (FT**3)	POWER REQUIREMENT	19.5 WATT
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ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	103	227	309	1202
EQUIPMENT QUANTITIES	9	2	2	1
WEIGHT	135.72 LBS			
HARNESS WEIGHT		53.1 (LBS)		
RELIABILITY		.9437		

VOLUME	2.68 (FT**3)	POWER DISSIPATION	33.6 WATT
		74.1 (LBS)	

MISSION EQUIPMENT

WEIGHT	240.00 LBS	VOLUME	9.50 (FT**3)
RELIABILITY		.9000	

POWER REQUIREMENT 300.0 WATT

VI-327

ARCOMSAT F/O CC3-1-2

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	10.0 (FT**2),	BATTERY RADIATOR AREA	0.9 (FT**2)
HEATER POWER	964.3 (BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	21511.9 (WATT-IN),	BATTERY HEATER POWER	85.1 (BTU/HR)
HEAT PIPE LENGTH	5.2 (FT)	TOTAL HEATER POWER	1049.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1086.6 (WATT-IN)
		AVERAGE HEAT LOAD	1164.5 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	UNIT WEIGHT (LBS)
HEAT PIPES	23.7
PHASE CHANGE MATERIAL	5.5
RADIATOR (PASSIVE)	1.8
	6.3
TOTAL	37.3

IERR 11C0010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	254. ,	81910.347 (IN),	.444 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.128 (IN),	.638 (IN)
GRID BEAM THICKNESS	.124 (IN),	SPACING 3.485 (IN),	HEIGHT 1.742 (IN)
ENCLOSURE THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	119.13 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	53.3 (LBS)		

VI-328

ARCOMSAT F/O CC3-1-2

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
490	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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ARCOMSAT F/O CC3-1-2

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	9	4.2	.1	0.0
227	BATTERY	2	30.4	.4	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	240.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	60.7
POWER CONTROL	75.0
CONVECTERS	15.9
SOLAR ARRAY	74.1
HARNESS	53.1
STRUCTURE	321.6
THERMAL CONTROL	37.3
OPY WEIGHT	1019.5
PROPELLANT	140.2
SATELLITE ADAPTER	53.3

TOTAL LAUNCH WEIGHT 1213.0

V1-330

ECS F/O CC3-1-5

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION -- SPIN CONTROL
 POINTING ACCURACY = .400000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 23324.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.(IPS)
 COPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)
 ELECTRICAL POWER
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 314.25 WATTS
 TOTAL SOLAR ARRAY AREA 130.71 SQ FT
 INSTALLED BATTERY CAPACITY 28.00 AMP-HR
 BEGINNING OF LIFE POWER 422.82 WATTS
 VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 1033.2 LBS (468.7 KG) LAUNCH WEIGHT = 1079.4 LBS (489.6
 DIMENSIONS LENGTH HEIGHT WIDTH
 EQUIPMENT BAY 60.0 IN.(1.52 M) 99.9 IN.(2.54 M) 99.9 IN.(2.54
 MISSION EQUIPMENT 18.4 IN.(.47 M) 30.7 IN.(.78 M) 30.7 IN.(.78
 TOTAL SATELLITE 78.4 IN.(1.99 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 263.5 IYY = 1213700.9 IZZ = 1213700.9
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 43.3 IN.(1.10 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00
 RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
 MISSION LIFETIME 60.0(MO)
 MEAN MISSION DURATION 50.5(MO)
 RELIABILITY .602

V1-331

ECS F/D CC3-1-5

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3)
RELIABILITY .9051
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8258
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 224 306 1202
EQUIPMENT QUANTITIES 8 2 2 1
WEIGHT 128.99 LBS VOLUME 2.21(FT**3)
HARNESS WEIGHT 46.7(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9644

POWER DISSIPATION 25.1 WATTS
64.3(LBS)

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 260.0 WATTS

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ECS F/D CC3-1-5

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	8.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	847.0 (BTU/HR),	TOTAL RADIATOR AREA	10.0 (FT**2)
HEAT PIPE	17729.2 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	961.9 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1014.3 (WATT-IN)
		AVERAGE HEAT LOAD	1028.1 (BTU/HR)

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	21.1	
HEAT PIPES	5.1	
PHASE CHANGE MATERIAL	1.8	
RADIATOR (PASSIVE)	5.6	

TOTAL	33.6	

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.013 (IN)		
STRINGER NO., THICKNESS, HT.	251. ,	81910.347 (IN),	.420 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.121 (IN),	.603 (IN)
GRID BEAM THICKNESS	.119 (IN),	SPACING 3.341 (IN),	HEIGHT 1.671 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	115.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	46.1 (LBS)		

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ECS F/O CC3-1-5

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	CUMPD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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ECS F/O CC3-1-5

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	64.3
HARNESSES	46.7
STRUCTURE	269.2
THERMAL CONTROL	33.6
DRY WEIGHT	893.0
PROPELLANT	140.2
SATELLITE ADAPTER	46.1

TOTAL LAUNCH WEIGHT 1079.4

V1-335

MAROTS CC3-1-6, -17, -21

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTUI)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.

256.

13.

8.

18.

.1250

64.

0.

0.

0.

0.

0.

0.0000

0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 294.25 WATTS

TOTAL SOLAR ARRAY AREA 122.40 SQ FT

INSTALLED BATTERY CAPACITY 24.00 AMP-HR

BEGINNING OF LIFE POWER 395.91 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 994.5 LBS (451.1 KG)

LAUNCH WEIGHT = 1038.3 LBS (471.0 KG)

DIMENSIONS

EQUIPMENT BAY 58.0 IN.(1.47 M)

MISSION EQUIPMENT 18.4 IN.(.47 M)

TOTAL SATELLITE 76.5 IN.(1.94 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

240.1 IYY = 1105686.2

IZZ = 1105686.2

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 42.2 IN.(1.07 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 50.5(MO)

RELIABILITY .602

71-336

MAROTS CC3-1-6, -17, -21

* * * SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413
EQUIPMENT QUANTITIES	1	1	1	1	2	1
WEIGHT	36.10 LBS				1.43(FT**3)	
RELIABILITY		.9051				
IERR	0					

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118
EQUIPMENT QUANTITIES	6	2	5	9	1	1	2
WEIGHT	208.54 LBS				5.72(FT**3)		
DRY WEIGHT	68.33(LBS)						
RELIABILITY		.8258					
IERR	11						

518	701	1203	603
1	2	1	1
POWER REQUIREMENT 1.0 WATTS			
140.20(LBS)			

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403
EQUIPMENT QUANTITIES	1	1
WEIGHT	21.18 LBS	
RELIABILITY		.9668
IERR		

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603
EQUIPMENT QUANTITIES	1	1	2	1	2	1
WEIGHT	24.62 LBS				.92(FT**3)	
RELIABILITY		.9601				
IERR	*****					

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	103	221	306	1202
EQUIPMENT QUANTITIES	7	2	2	1
WEIGHT	117.20 LBS			
HARNESS WEIGHT		45.0(LBS)		
RELIABILITY		.9649		

2.03(FT**3)	POWER DISSIPATION 23.5 WATTS
60.2(LBS)	

MISSION EQUIPMENT

WEIGHT	200.00 LBS	VOLUME	7.92(FT**3)
RELIABILITY		.9000	

POWER REQUIREMENT 240.0 WATTS

V1-337

MAROTS CC3-1-6, -17, -21

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL
RADIATOR AREA

8.2 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	TOTAL RADIATOR AREA	9.0 (FT**2)
788.3 (BTU/HR),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE	TOTAL HEATER POWER	851.9 (BTU/HR)
16143.7 (WATT-IN),	VARIABLE CONDUCTANCE H.P.	989.2 (WATT-IN)
HEAT PIPE LENGTH	AVERAGE HEAT LOAD	959.9 (BTU/HR)
4.8 (FT)		
STORED ENERGY		
72.1 (BTU)		

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	20.1
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	5.2

TOTAL	32.2

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.013 (IN)		
STRINGER NO., THICKNESS, HT.	248.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.411 (IN)
GRID BEAM THICKNESS	.117 (IN),	.118 (IN),	.590 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	3.300 (IN),	1.650 (IN)
EQUIPMENT BAY STRUCTURE WT.	112.2 (LBS)	0.000 (IN),	.030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	43.9 (LBS)		

V1-338

MAROTS CC3-1-6, -17, -21

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUITATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-339

MAROTS CC3-1-6, -17, -21

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	50.6
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	60.2
HARNESS	45.0
STRUCTURE	249.5
THERMAL CONTROL	32.2
DRY WEIGHT	854.2
PROPELLANT	140.2
SATELLITE ADAPTER	43.9

TOTAL LAUNCH WEIGHT 1038.3

V1-340

TV BRDCST SAT (TVBS) CC3-1-8

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 105543.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
125.
8.
4.
1.0000
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 1062.68 WATTS
TOTAL SOLAR ARRAY AREA 122.94 SQ FT
INSTALLED BATTERY CAPACITY 144.00 AMP-HR
BEGINNING OF LIFE POWER 1565.35 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 2617.2 LBS (1187.2 KG)
DIMENSIONS

EQUIPMENT BAY 46.6 IN.(1.18 M)
MISSION EQUIPMENT 29.6 IN.(.75 M)
TOTAL SATELLITE 76.2 IN.(1.94 M)

LAUNCH WEIGHT = 2711.8 LBS (1230.0 KG)
HEIGHT

77.6 IN.(1.97 M) 77.6 IN.(1.97 M)
49.4 IN.(1.25 M) 49.4 IN.(1.25 M)

MOMENTS OF INERTIA (SLUGS*FT*2) IXX =

641.3 IYY = 2112428.1 IZZ = 3188326.3

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 38.2 IN.(.97 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 84.0(MD)
MEAN MISSION DURATION 64.8(MD)
RELIABILITY .408

V1-341

TV BROCST SAT (TVBS) CC3-1-8

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 3 2 2 2

WEIGHT 60.00 LBS VOLUME 1.93(FT**3)

RELIABILITY .9814

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONO PROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130

EQUIPMENT QUANTITIES 18 8 5 9 2 1 4

WEIGHT 743.83 LBS VOLUME 17.50(FT**3)

DRY WEIGHT 148.15(LBS), EXPENDABLE WEIGHT

RELIABILITY .7844

IERR 1

521 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
595.67(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 2 2

WEIGHT 42.36 LBS VOLUME .78(FT**3)

RELIABILITY .9990

IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 3 2 2 3 2

WEIGHT 37.64 LBS VOLUME 1.08(FT**3)

RELIABILITY .9902

IERR*****

POWER REQUIREMENT 25.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 530 263 650 702

EQUIPMENT QUANTITIES 4 12 4 4 2

WEIGHT 320.60 LBS VOLUME 4.79(FT**3)

HARNESS WEIGHT 117.1(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .5952

POWER DISSIPATION 179.4 WATTS
85.6(LBS)

MISSION EQUIPMENT

WEIGHT 830.00 LBS VOLUME 32.81(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 830.0 WATTS

VI-342

TV BRDCST SAT (TVBS) CC3-1-8

* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	32.2 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	3085.7(BTU/HR),	TOTAL RADIATOR AREA	32.7 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	33.3(BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	3119.0(BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	771.4(WATT-IN)
		AVERAGE HEAT LOAD	3222.9 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	UNIT WEIGHT (LBS)
HEAT PIPES	16.9
PHASE CHANGE MATERIAL	5.0
RADIATOR (ACTIVE)	2.6
	66.1

TOTAL	90.6

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.023 (IN)			
STRINGER NO., THICKNESS, HT.	169.		81910.347 (IN),	.486 (IN)
FRAME NO., THICKNESS, HT.	5.		.139 (IN),	.697 (IN)
GRID BEAM THICKNESS	.204 (IN),	SPACING	5.755 (IN),	HEIGHT 2.878 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	243.1 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	29.4 (LBS)			
ADAPTER WEIGHT	94.6 (LBS)			

✓ 1-343

TV BRDCST SAT (TVBS) CC3-1-8

*** ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	8	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMMD DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-344

TV BRDCST SAT (TVBS) CC3-1-8

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
263	BATTERY	4	49.5	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	830.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	148.2
DATA PROCESSING	42.4
COMMUNICATIONS	37.6
BATTERIES	198.0
POWER CONTROL	122.6
SOLAR ARRAY	85.6
HARNESS	117.1
STRUCTURE	275.3
SOLAR ARRAY DRIVE	14.2
THERMAL CONTROL	90.6
DRY WEIGHT	2021.6
PROPELLANT	595.7
SATELLITE ADAPTER	94.6

TOTAL LAUNCH WEIGHT 2711.8

V1-345

TVBS F/O CC3-1-9

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 105544.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
125.	0.
8.	0.
4.	0.
1.0000	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 1061.92 WATTS
TOTAL SOLAR ARRAY AREA 122.85 SQ FT
INSTALLED BATTERY CAPACITY 144.00 AMP-HR
BEGINNING OF LIFE POWER 1564.23 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 2601.4 LBS (1180.0 KG)

LAUNCH WEIGHT = 2695.4 LBS (1222.6 KG)

DIMENSIONS

EQUIPMENT BAY 46.3 IN. (1.18 M)

77.2 IN. (1.96 M)

77.2 IN. (1.96 M)

MISSION EQUIPMENT 29.7 IN. (0.76 M)

49.6 IN. (1.26 M)

49.6 IN. (1.26 M)

TOTAL SATELLITE 76.1 IN. (1.93 M)

MOMENTS OF INERTIA (SLUGS*FT*2) IXX =

633.8 IYY = 2090912.0

IZZ = 3161864.7

CENTER OF GRAVITY 38.3 IN. (.97 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 84.0(MO)

MEAN MISSION DURATION 67.2(MO)

RELIABILITY .401

748-11-346

TVBS F/O CC3-1-9

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 3 2 2 2

WEIGHT 60.00 LBS VOLUME 1.93(FT**3)

RELIABILITY .9814

IERR 10

POWER REQUIREMENT

78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 2 1 4

WEIGHT 742.44 LBS VOLUME 17.45(FT**3)

DRY WEIGHT 146.75(LBS), EXPENDABLE WEIGHT

RELIABILITY .6991

IERR 1

521 701 1203 603

1 2 1 1

POWER REQUIREMENT

4.3 WATTS

595.68(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME .39(FT**3)

RELIABILITY .9538

IERR 1

POWER REQUIREMENT

10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 3 2 2 3 2

WEIGHT 37.64 LBS VOLUME 1.08(FT**3)

RELIABILITY .9902

IERR*****

POWER REQUIREMENT

25.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 531 263 650 702

EQUIPMENT QUANTITIES 4 7 4 4 2

WEIGHT 324.87 LBS VOLUME 4.85(FT**3)

HARNESS WEIGHT 112.5(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .6874

POWER DISSIPATION

1796.3 WATTS

85.5(LBS)

MISSION EQUIPMENT

WEIGHT 840.00 LBS VOLUME

RELIABILITY 9000

33.21(FT**3)

POWER REQUIREMENT

840.0 WATTS

V1-347

TVBS F/O CC3-1-9

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	32.6 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	3119.1 (BTU/HR),	TOTAL RADIATOR AREA	33.1 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	3152.4 (BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	770.3 (WATT-IN)
		AVERAGE HEAT LOAD	3257.0 (BTU/HR)

THERMAL CONTROL WEIGHT	
INSULATION	16.8
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	2.6
RADIATOR (ACTIVE)	66.6
TOTAL	91.0

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.023 (IN)		
STRINGER NO., THICKNESS, HT.	169.	81910.347 (IN),	.484 (IN)
FRAME NO., THICKNESS, HT.	5.	.139 (IN),	.695 (IN)
GRID BEAM THICKNESS	.204 (IN),	SPACING 5.736 (IN),	HEIGHT 2.868 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	239.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	29.4 (LBS)		
ADAPTER WEIGHT	94.0 (LBS)		

V11-348

TVBS F/O CC3-1-9

* * * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

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TVBS F/O CC3-1-9

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
531	SHUNT REGULATOR	7	4.3	.1	0.0
263	BATTERY	4	49.5	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	840.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	146.8
DATA PROCESSING	21.2
COMMUNICATIONS	37.6
BATTERIES	198.0
POWER CONTROL	126.9
SOLAR ARRAY	85.5
HARNESS	112.5
STRUCTURE	272.0
SOLAR ARRAY DRIVE	14.2
THERMAL CONTROL	91.0
DRY WEIGHT	2005.7
PROPELLANT	595.7
SATELLITE ADAPTER	94.0

TOTAL LAUNCH WEIGHT 2695.4

V1-350

SYMPHONIE 3 CC3-1-10, -15

* * * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
CONFIGURATION - - MASS. EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .500000(DEG.)
AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 20143. (LB-SEC)
DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0. (IPS)
CDPI TABLE
NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME
ENGINEERING DATA
MISSION EQUIPMENT DATA
COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)
ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 333.78 WATTS
TOTAL SOLAR ARRAY AREA 37.91 SQ FT
INSTALLED BATTERY CAPACITY 44.00 AMP-HR
BEGINNING OF LIFE POWER 482.70 WATTS
VEHICLE SIZING
CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 838.7 LBS (380.4 KG) LAUNCH WEIGHT = 870.7 LBS (394.9 KG)
DIMENSIONS
EQUIPMENT BAY 34.2 IN. (.87 M) 56.9 IN. (1.45 M) 56.9 IN. (1.45 M)
MISSION EQUIPMENT 19.3 IN. (.49 M) 32.2 IN. (.82 M) 32.2 IN. (.82 M)
TOTAL SATELLITE 53.5 IN. (1.36 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 97.2 IYY = 358436.5 IZZ = 477613.4
X-CG Y-CG Z-CG
CENTER OF GRAVITY 26.9 IN. (.68 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)
RELIABILITY
CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 49.1(MO)
RELIABILITY .559

VI-351

20

SYMPHONIE 3 CC3-1-10, -15

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1809 1303

EQUIPMENT QUANTITIES 2 2 2 1

WEIGHT 66.90 LBS VOLUME 2.21 (FT**3)

RELIABILITY .9351

IERR .0

POWER REQUIREMENT

64.7 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124 509 701 1203 603

EQUIPMENT QUANTITIES 12 4 5 9 1 1 1 1 2 1 1

WEIGHT 183.16 LBS VOLUME 5.41 (FT**3)

DRY WEIGHT 65.14 (LBS), EXPENDABLE WEIGHT

RELIABILITY .8388

IERR 0

POWER REQUIREMENT

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME .39 (FT**3)

RELIABILITY .9668

IERR 1

POWER REQUIREMENT

10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 2 1 1 2 2

WEIGHT 25.52 LBS VOLUME .94 (FT**3)

RELIABILITY .9256

IERR*****

POWER REQUIREMENT

25.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 243 609 702

EQUIPMENT QUANTITIES 2 5 2 2 1

WEIGHT 121.64 LBS VOLUME 1.35 (FT**3)

HARNESS WEIGHT 37.7 (LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8846

POWER DISSIPATION

53.6 WATTS

MISSION EQUIPMENT

WEIGHT 229.00 LBS VOLUME 9.07 (FT**3)

RELIABILITY .9000

POWER REQUIREMENT

167.0 WATTS

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SYMPHONIE 3 CC3-1-10, -15

*** SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	7.9 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	746.2 (BTU/HR),	TOTAL RADIATOR AREA	8.9 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	85.6 (BTU/HR)
HEAT PIPE LENGTH	3.3 (FT)	TOTAL HEATER POWER	831.7 (BTU/HR)
STORED ENERGY	92.0 (BTU)	VARIABLE CONDUCTANCE H.P.	541.3 (WATT-IN)
		AVERAGE HEAT LOAD	913.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	10.6
HEAT PIPES	3.5
PHASE CHANGE MATERIAL	2.3
RADIATOR (PASSIVE)	5.0
TOTAL	21.5

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO., THICKNESS, HT.	191.	81910.347 (IN),	.314 (IN)	
FRAME NO., THICKNESS, HT.	5.	.090 (IN),	.451 (IN)	
GRID BEAM THICKNESS	.117 (IN),	SPACING 3.282 (IN),	HEIGHT 1.641 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 7.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	85.1 (LBS)			
SOLAR ARRAY ROOM AND DRIVE WT.	19.6 (LBS)			
ADAPTER WEIGHT	32.0 (LBS)			

V1-353

SYMPHONIE 3 CC3-1-10, -15

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1809	EARTH SENSOR	2	22.2	.8	1.4
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	RASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	1	4.7	.0	18.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

V1-354

SYMPHONIE 3 CC3-1-10, -15

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	5	2.3	.0	0.0
243	BATTERY	2	37.0	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	229.0
STABILITY AND CONTROL	66.9
AUXILIARY PROPULSION	65.1
DATA PROCESSING	21.2
COMMUNICATIONS	25.5
BATTERIES	74.1
POWER CONTROL	47.6
SOLAR ARRAY	26.4
HARNESS	37.7
STRUCTURE	101.3
SOLAR ARRAY DRIVE	4.4
THERMAL CONTROL	21.5
DRY WEIGHT	720.7
PROPELLANT	118.0
SATELLITE ADAPTER	32.0

TOTAL LAUNCH WEIGHT 870.7

VI-355

AM RADIO SAT (AMSAT) CC3-1-11

*** SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = 1.400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 7619.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPT TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 60.51 WATTS
TOTAL SOLAR ARRAY AREA 23.71 SQ FT
INSTALLED BATTERY CAPACITY 6.00 AMP-HR
BEGINNING OF LIFE POWER 76.69 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 365.7 LBS (165.9 KG)

LAUNCH WEIGHT =

379.1 LBS (171.9 KG)

DIMENSIONS

EQUIPMENT BAY 30.9 IN. (.78 M)
MISSION EQUIPMENT 10.3 IN. (.26 M)
TOTAL SATELLITE 41.2 IN. (1.05 M)

HEIGHT 51.4 IN. (1.31 M)
17.2 IN. (.44 M)

WIDTH 51.4 IN. (1.31 M)
17.2 IN. (.44 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

30.0 IYY = 114678.6

IZZ = 114678.6

CENTER OF GRAVITY 20.2 IN. (.51 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APCGEE/PERYCEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 24.0(MO)
MEAN MISSION DURATION 20.0(MO)
RELIABILITY .1537

VI-356

AM RADIO SAT (AMSAT) CC3-1-11

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	803	1413
EQUIPMENT QUANTITIES	1	1	1	1	1	1
WEIGHT	25.28 LBS				1.18(FT**3)	
RELIABILITY		.9198				
IERR	0					

POWER REQUIREMENT 9.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1116
EQUIPMENT QUANTITIES	6	2	4	9	1	1	1
WEIGHT	99.55 LBS				3.84(FT**3)		
DRY WEIGHT	53.75(LBS)						
RELIABILITY		.7398					
IERR	11						

507 701 1203 603
1 1 1 1
POWER REQUIREMENT 1.0 WATTS
45.80(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403
EQUIPMENT QUANTITIES	1	1
WEIGHT	21.18 LBS	
RELIABILITY		.9866
IERR	1	

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603
EQUIPMENT QUANTITIES	1	1	1	1	1	1
WEIGHT	21.02 LBS				.87(FT**3)	
RELIABILITY		.9206				
IERR	*****					

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	102	202	303	1202
EQUIPMENT QUANTITIES	5	2	2	1
WEIGHT	62.47 LBS			
HARNESS WEIGHT		20.3(LBS)		
RELIABILITY		.9658		

POWER DISSIPATION 5.7 WATTS
11.7(LBS)

MISSION EQUIPMENT

WEIGHT	25.00 LBS		
RELIABILITY		.9000	

POWER REQUIREMENT 20.0 WATTS

V1-357

AM RADIO SAT (AMSAT) CC3-1-11

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	1.9 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	153.0 (BTU/HR),	TOTAL RADIATOR AREA	3.2 (FT**2)
HEAT PIPE	1869.0 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	2.6 (FT)	TOTAL HEATER POWER	276.1 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	532.8 (WATT-IN)
		AVERAGE HEAT LOAD	206.3 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	8.6
HEAT PIPES	2.7
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	1.2
TOTAL	14.3

IERR 11C0010111

STRUCTURES					
SKIN THICKNESS	.009 (IN)				
STRINGER NO., THICKNESS, HT.	222.		81910.347 (IN),		.244 (IN)
FRAME NO., THICKNESS, HT.	5.		.070 (IN),		.351 (IN)
GRID BEAM THICKNESS	.078 (IN),		2.195 (IN),	HEIGHT	1.097 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	64.6 (LBS)				
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)				
ADAPTER WEIGHT	13.14 (LBS)				

V1-358

AM RADIO SAT (AMSAT) CC3-1-11

* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
507	TANK	1	6.7	.3	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
206	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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AM RADIO SAT (AMSAT) CC3-1-11

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	5	5.0	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	35.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.8
DATA PROCESSING	21.2
COMMUNICATIONS	21.0
BATTERIES	19.0
POWER CONTROL	43.5
CONVERTERS	15.9
SOLAR ARRAY	11.7
FARNESSE	20.3
STRUCTURE	50.9
THERMAL CONTROL	14.3
DRY WEIGHT	319.9
PROPELLANT	45.8
SATELLITE ADAPTER	13.4

TOTAL LAUNCH WEIGHT	379.1
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VI-360

APEX PASS P/L EXP (APPLE) CC3-1-12

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .500000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 267.25 WATTS
TOTAL SOLAR ARRAY AREA 111.16 SQ FT
INSTALLED BATTERY CAPACITY 22.00 AMP-HR
BEGINNING OF LIFE POWER 359.59 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 880.0 LBS (399.2 KG)

DIMENSIONS

EQUIPMENT BAY 55.3 IN.(1.40 M)
MISSION EQUIPMENT 16.6 IN.(.42 M)
TOTAL SATELLITE 71.9 IN.(1.83 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

197.9 IYY = 893526.1

IZZ = 893526.1

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 38.6 IN.(.98 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 50.4(MO)

RELIABILITY .601

V1-361

APEX PASS P/L EXP (APPLE) CC3-1-12

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 30.56 LBS VOLUME 1.21(FT**3)
RELIABILITY .9022
IERR 0

POWER REQUIREMENT 9.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)
RELIABILITY .8259
IERR 11

POWER REQUIREMENT 1.0 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 218 306 1202
EQUIPMENT QUANTITIES 7 2 2 1
WEIGHT 109.60 LBS VOLUME 1.97(FT**3)
HARNESS WEIGHT 40.3(LBS), SOLAR ARRAY WEIGHT 54.6(LBS)
RELIABILITY .9649

POWER DISSIPATION 21.2 WATTS

MISSION EQUIPMENT

WEIGHT 145.00 LBS VOLUME 5.74(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 215.0 WATTS

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APEX PASS P/L EXP (APPLE) CC3-1-12

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	7.5 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	712.1 (BTU/HR),	TOTAL RADIATOR AREA	8.6 (FT**2)
HEAT PIPE	13771.4 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.5 (FT)	TOTAL HEATER POWER	827.0 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	929.7 (WATT-IN)
		AVERAGE HEAT LOAD	871.3 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		18.4
HEAT PIPES		4.7
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		4.7

TOTAL		29.7

IERP 1100010111

STRUCTURES							
SKIN THICKNESS	.013 (IN)	249.		81910.347 (IN),		.390 (IN)	
STRINGER NO., THICKNESS, HT.		5.		.112 (IN),		.560 (IN)	
FRAME NO., THICKNESS, HT.		.111 (IN),		3.129 (IN),		1.564 (IN)	
GRID BEAM THICKNESS		.030 (IN),		0.000 (IN),		.030 (IN)	
ENDCOVER THICKNESS- FORWARD		108.3 (LBS)					
EQUIPMENT BAY STRUCTURE WT.		0.0 (LBS)					
SOLAR ARRAY BOOM AND DRIVE WT.		38.2 (LBS)					
ADAPTER WEIGHT.							

VI-363

APEX PASS P/L EXP (APPLE) CC3-1-12

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	2	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASE/NO ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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APEX PASS P/L EXP (APPLE) CC3-1-12

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
218	BATTERY	2	21.0	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	145.0
STABILITY AND CONTROL	14.7
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	42.0
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	54.6
HARNESS	40.3
STRUCTURE	216.8
THERMAL CONTROL	29.7
DRY WEIGHT	739.8
PROPELLANT	140.2
SATELLITE ADAPTER	38.2

TOTAL LAUNCH WEIGHT 918.1

V1-365

INSAT F/O CC3-1-14

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
 CONFIGURATION - - SPIN CONTROL
 POINTING ACCURACY = .400000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION - - MONOPROPELLANT
 TOTAL IMPULSE = 23324.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.(IPS)
 CPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)
 ELECTRICAL POWER
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 342.75 WATTS
 TOTAL SOLAR ARRAY AREA 144.43 SQ FT
 INSTALLED BATTERY CAPACITY 28.00 AMP-HR
 BEGINNING OF LIFE POWER 467.18 WATTS
 VEHICLE SIZING
 CONFIGURATION - - CYLINDER
 WET SATELLITE WEIGHT = 1119.9 LBS (508.0 KG) LAUNCH WEIGHT = 1170.9 LBS (531.1 KG)
 DIMENSIONS LENGTH HEIGHT WIDTH
 EQUIPMENT BAY 63.0 IN.(1.60 M) 105.0 IN.(2.67 M) 105.0 IN.(2.67 M)
 MISSION EQUIPMENT 19.2 IN.(.49 M) 32.0 IN.(.81 M) 32.0 IN.(.81 M)
 TOTAL SATELLITE 82.2 IN.(2.09 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 307.9 IYY = 1430292.5 IZZ = 1430292.5
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 46.1 IN.(1.17 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)
 RELIABILITY
 CONFIGURATION - - SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
 MISSION LIFETIME 60.0(MO)
 MEAN MISSION DURATION 51.4(MO)
 RELIABILITY .626

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INSAT F/O CC3-1-14

* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80 (FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72 (FT**3)
DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT
RELIABILITY .8259
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39 (FT**3)
RELIABILITY .9668
IERR

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92 (FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 224 309 1202
EQUIPMENT QUANTITIES 9 2 2 1
WEIGHT 133.19 LBS VOLUME 2.14 (FT**3)
HARNESS WEIGHT 51.9 (LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9437

POWER DISSIPATION 32.2 WATTS
71.0 (LBS)

MISSION EQUIPMENT

WEIGHT 225.00 LBS VOLUME 8.91 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 285.0 WATTS

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INSAT F/O CC3-1-14

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	9.5 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	920.3 (BTU/HR),	TOTAL RADIATOR AREA	10.7 (FT**2)
HEAT PIPE		BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	20130.9 (WATT-IN),	TOTAL HEATER POWER	1035.3 (BTU/HR)
STORED ENERGY	5.1 (FT)	VARIABLE CONDUCTANCE H.P.	1063.5 (WATT-IN)
	72.1 (BTU)	AVERAGE HEAT LOAD	1113.4 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	22.8
HEAT PIPES	5.4
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	6.0
TOTAL	36.1

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	253.	81910.347 (IN),	.437 (IN)
FRAME NO., THICKNESS, HT.	5.	.125 (IN),	.627 (IN)
GRID BEAM THICKNESS	.122 (IN),	SPACING 3.442 (IN),	HEIGHT 1.721 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	118.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	51.0 (LBS)		

895-11

INSAT F/O CC3-1-14

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	RASERND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	1.5	.0	1.0

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INSAT F/O CC3-1-14

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NT	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	9	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	225.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	75.0
CONVERTERS	15.9
SOLAR ARRAY	71.0
HARNESS	51.9
STRUCTURE	304.9
THERMAL CONTROL	36.1
DRY WEIGHT	979.7
PROPELLANT	140.2
SATELLITE ADAPTER	51.0

TOTAL LAUNCH WEIGHT 1170.9

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PALAPA F/O CC3-1-16

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 38403. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

DPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.

0.

256.

0.

125.

0.

8.

0.

4.

0.

1.0000

0.0000

64.

0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 256.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 829.02 WATTS

TOTAL SOLAR ARRAY AREA 94.11 SQ FT

INSTALLED BATTERY CAPACITY 100.00 AMP-HR

BEGINNING OF LIFE POWER 1198.34 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1493.1 LBS (677.3 KG)

LAUNCH WEIGHT = 1548.1 LBS (702.2 KG)

DIMENSIONS LENGTH

HEIGHT

WIDTH

EQUIPMENT BAY 39.0 IN. (.99 M)

65.0 IN. (1.65 M)

65.0 IN. (1.65 M)

MISSION EQUIPMENT 25.0 IN. (.64 M)

41.7 IN. (1.06 M)

41.7 IN. (1.06 M)

TOTAL SATELLITE 64.0 IN. (1.63 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

281.7 IYY = 846768.4

IZZ = 1425887.1

CENTER OF GRAVITY 33.3 IN. (.85 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0 (MO)

MEAN MISSION DURATION 49.5 (MO)

RELIABILITY .604

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PALAPA F/O CC3-1-16

* * * SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303		
EQUIPMENT QUANTITIES	2	2	1	2		
WEIGHT	43.00 LBS				1.24 (FT**3)	POWER REQUIREMENT 78.9 WATT
RELIABILITY		.9418				
IERR	10					

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	906	1003	499	203	1130	509	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	2	1	2	1	1
WEIGHT	313.24 LBS										
DRY WEIGHT	95.03 (LBS)										
RELIABILITY		.8866									
IERR	11										
VOLUME					10.15 (FT**3)						
EXPENDABLE WEIGHT								218.20 (LBS)			
POWER REQUIREMENT											3 WATT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403	
EQUIPMENT QUANTITIES	1	1	
WEIGHT	21.18 LBS		
RELIABILITY		.9668	
IERR	1		
VOLUME		.39 (FT**3)	
POWER REQUIREMENT			10.5 WATT

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	106	327	401	503	605
EQUIPMENT QUANTITIES	1	2	2	1	3	2
WEIGHT	31.72 LBS					
RELIABILITY		.9770				
IERR	*****					
VOLUME					1.00 (FT**3)	
POWER REQUIREMENT						5.5 WATT

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	414	515	269	650	702
EQUIPMENT QUANTITIES	2	11	2	2	1
WEIGHT	215.85 LBS				
HARNESS WEIGHT		58.9 (LBS)			
RELIABILITY		.8509			
VOLUME				2.50 (FT**3)	
SOLAR ARRAY WEIGHT				65.5 (LBS)	
POWER DISSIPATION					132.6 WATT

MISSION EQUIPMENT

WEIGHT	500.00 LBS			
RELIABILITY		.9000		
VOLUME		19.78 (FT**3)		
POWER REQUIREMENT				630.0 WATT

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PALAPA F/O CC3-1-16

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

HERMAL CONTROL			
RADIATOR AREA	25.4 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2380.3 (BTU/HR),	TOTAL RADIATOR AREA	26.3 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	2470.3 (BTU/HR)
STORED ENERGY	119.5 (BTU)	VARIABLE CONDUCTANCE H.P.	648.0 (WATT-IN)
		AVERAGE HEAT LOAD	2540.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	13.1
HEAT PIPES	4.2
PHASE CHANGE MATERIAL	3.0
RADIATOR (ACTIVE)	56.4
TOTAL	76.6

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.017 (IN)		
STRINGER NO., THICKNESS, HT.	179.	81910.347 (IN),	.384 (IN)
FRAME NO., THICKNESS, HT.	5.	.110 (IN),	.552 (IN)
GRID BEAM THICKNESS	.153 (IN),	SPACING 4.302 (IN),	HEIGHT 2.151 (IN)
END COVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	126.7 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	26.1 (LBS)		
ADAPTER WEIGHT	55.0 (LBS)		

V1-373

PALAPA F/O CC3-1-16

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

V1-374

PALAPA F/O CC3-1-16

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
414	DISCHGE REGULATOR	2	9.7	.2	9.0
515	SHUNT REGULATOR	11	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	500.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	95.0
DATA PROCESSING	21.2
COMMUNICATIONS	31.7
BATTERIES	142.6
POWER CONTROL	73.3
SOLAR ARRAY	65.5
HARNESS	58.9
STRUCTURE	156.2
SOLAR ARRAY DRIVE	10.9
THERMAL CONTROL	76.6
DRY WEIGHT	1274.9
PROPELLANT	218.2
SATELLITE ADAPTER	55.0

TOTAL LAUNCH WEIGHT 1548.1

VI-375

IRAN F/O CC3-1-18

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.

256.

13.

8.

18.

.1250

64.

MISSION EQUIPMENT DATA

0.

0.

0.

0.

0.

0.0000

0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 417.75 WATTS

TOTAL SOLAR ARRAY AREA 173.77 SQ FT

INSTALLED BATTERY CAPACITY 34.00 AMP-HR

BEGINNING OF LIFE POWER 562.08 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1266.1 LBS (574.3 KG)

LAUNCH WEIGHT = 1326.3 LBS (601.6 KG)

DIMENSIONS

EQUIPMENT BAY 69.1 IN. (1.76 M)

115.2 IN. (2.93 M)

115.2 IN. (2.93 M)

MISSION EQUIPMENT 20.1 IN. (.51 M)

33.5 IN. (.85 M)

33.5 IN. (.85 M)

TOTAL SATELLITE 89.3 IN. (2.27 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

400.3 IYY = 1886268.9

IZZ = 1886268.9

CENTER OF GRAVITY 51.3 IN. (1.30 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 51.0(MO)

RELIABILITY .615

V1-376

IRAN F/O CC3-1-18

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80(FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8260
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 233 315 1202
EQUIPMENT QUANTITIES 10 2 2 1
WEIGHT 145.91 LBS VOLUME 2.57(FT**3)
HARNESS WEIGHT 56.7(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9269

POWER DISSIPATION 33.3 WATTS
85.4(LBS)

MISSION EQUIPMENT

WEIGHT 260.00 LBS VOLUME 10.29(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 360.0 WATTS

NI-377

IRAN F/O CC3-1-18

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

HERMAL CONTROL			
RADIATOR AREA	11.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1140.2 (BTU/HR),	TOTAL RADIATOR AREA	12.9 (FT**2)
HEAT PIPE	26878.5 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.6 (FT)	TOTAL HEATER POWER	1255.2 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1154.8 (WATT-IN)
		AVERAGE HEAT LOAD	1369.1 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		26.4
HEAT PIPES		5.9
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		7.4
TOTAL		41.5

IERR 1100010111

STRUCTURES:			
SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	260.	81910.347 (IN),	.466 (IN)
FRAME NO., THICKNESS, HT.	5.	.134 (IN),	.670 (IN)
GRID BEAM THICKNESS	.127 (IN),	SPACING 3.574 (IN),	HEIGHT 1.787 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	122.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	60.3 (LBS)		

VI-378

IRAN F/O CC3-1-18

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-379

IRAN F/O CC3-1-18

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	260.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	68.3
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	85.4
HARNESS	56.7
STRUCTURE	378.7
THERMAL CONTROL	41.5
DRY WEIGHT	1125.8
PROPELLANT	140.2
SATELLITE ADAPTER	60.3

TOTAL LAUNCH WEIGHT 1326.3

41-386

SIRIO F/O CC3-1-20

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
 CONFIGURATION -- SPIN CONTROL
 POINTING ACCURACY = .400000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 23324.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
 256.
 13.
 8.
 18.
 64.
 .1250

MISSION EQUIPMENT DATA

0.
 0.
 0.
 0.
 0.
 0.
 0.0000.
 0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 279.25 WATTS
 TOTAL SOLAR ARRAY AREA 116.16 SQ FT
 INSTALLED BATTERY CAPACITY 22.00 AMP-HR
 BEGINNING OF LIFE POWER 375.73 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 954.9 LBS (433.1 KG)

LAUNCH WEIGHT = 996.6 LBS (452.0 KG)

DIMENSIONS

EQUIPMENT BAY 56.5 IN.(1.44 M)
 MISSION EQUIPMENT 18.1 IN.(.46 M)
 TOTAL SATELLITE 74.7 IN.(1.90 M)

HEIGHT 94.2 IN.(2.39 M)
 30.2 IN.(.77 M)

WIDTH 94.2 IN.(2.39 M)
 30.2 IN.(.77 M)

MOMENTS OF INERTIA (--GS*FT**2) IXX =

220.8 IYY = 1013835.1

IZZ = 1013835.1

CENTER OF GRAVITY 41.0 IN.(1.04 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 50.5(MO)

RELIABILITY .602

VI-381

SIRIO F/O CC3-1-20

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3)
RELIABILITY .9051
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8257
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 218 306 1202
EQUIPMENT QUANTITIES 7 2 2 1
WEIGHT 108.60 LBS VOLUME 1.97(FT**3)
HARNESS WEIGHT 44.0(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9649

POWER DISSIPATION 22.3 WATTS
57.1(LBS)

MISSION EQUIPMENT

WEIGHT 190.00 LBS VOLUME 7.52(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 225.0 WATTS

VI-382

SIRIO F/O CC3-1-20

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	7.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	744.3 (BTU/HR),	TOTAL RADIATOR AREA	9.0 (FT**2)
HEAT PIPE	14921.7 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.7 (FT)	TOTAL HEATER POWER	859.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	965.8 (WATT-IN)
		AVERAGE HEAT LOAD	908.8 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	19.3
HEAT PIPES	4.9
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	4.9
TOTAL	31.0

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.013 (IN)		
STRINGER NO., THICKNESS, HT.	247.	81910.347 (IN),	.402 (IN)
FRAME NO., THICKNESS, HT.	5.	.115 (IN),	.577 (IN)
GRID BEAM THICKNESS	.115 (IN),	SPACING 3.249 (IN),	HEIGHT 1.625 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	109.8 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	41.7 (LBS)		

VI-383

SIRIO F/O CC3-1-20

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMDO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-384

SIRIO F/O CC3-1-20

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
218	BATTERY	2	21.0	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	190.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	42.0
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	57.1
HARNES	44.0
STRUCTURE	233.8
THERMAL CONTROL	31.0
DRY WEIGHT	814.7
PROPELLANT	140.2
SATELLITE ADAPTER	41.7

TOTAL LAUNCH WEIGHT 996.6

VI-385

NCRDSAT F/O CC3-1-22,-38

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 309.25 WATTS
TOTAL SOLAR ARRAY AREA 128.63 SQ FT
INSTALLED BATTERY CAPACITY 28.00 AMP-HR
BEGINNING OF LIFE POWER 416.10 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1051.0 LBS (476.7 KG)

LAUNCH WEIGHT = 1097.7 LBS (497.9 KG)

DIMENSIONS

EQUIPMENT BAY 59.5 IN.(1.51 M)
MISSION EQUIPMENT 19.0 IN.(.48 M)
TOTAL SATELLITE 78.5 IN.(1.99 M)

LENGTH 99.1 IN.(2.52 M) HEIGHT 31.7 IN.(.81 M) WIDTH 99.1 IN.(2.52 M)
31.7 IN.(.81 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

264.0 IYY = 1221379.0 IZZ = 1221379.0

CENTER OF GRAVITY 43.7 IN.(1.11 M)

0.0 IN.(0.00 M) X-CG Y-CG Z-CG 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.5(MO)
RELIABILITY .602

VI-386

NCRDSAT F/O CC3-1-22, - 38

* * SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3)
RELIABILITY .9051
IERR 0

POWER REQUIREMENT 10.4 WATTS

UXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8258
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (OTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 224 306 1202
EQUIPMENT QUANTITIES 8 2 2 1
WEIGHT 128.99 LBS VOLUME 2.21(FT**3)
HARNESS WEIGHT 47.5(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9644

POWER DISSIPATION 24.7 WATTS
63.2(LBS)

MISSION EQUIPMENT

WEIGHT 220.00 LBS VOLUME 8.71(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 255.0 WATTS

V1-387

NERDSAT F/O CC3-1-22, - 38

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

HERMAL CONTROL			
RADIATOR AREA	8.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	832.3 (BTU/HR),	TOTAL RADIATOR AREA	9.8 (FT**2)
HEAT PIPE	17461.0 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	947.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1015.8 (WATT-IN)
		AVERAGE HEAT LOAD	1011.1 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	21.0
HEAT PIPES	5.2
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	5.5
TOTAL	33.4

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	248.		
FRAME NO., THICKNESS, HT.	5.		
GRID BEAM THICKNESS	.120 (IN)	81910.347 (IN),	.421 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN)	.121 (IN),	.604 (IN)
EQUIPMENT BAY STRUCTURE WT.	115.4 (LBS)	SPACING 3.380 (IN),	HEIGHT 1.690 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)	0.000 (IN),	AFT .030 (IN)
ADAPTER WEIGHT	46.7 (LBS)		

VI-388

NCRDSAT F/O CC3-1-22, - 38

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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NORDSAT F/O CC3-1-22, -38

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	220.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	63.2
HARNES	47.5
STRUCTURE	267.5
THERMAL CONTROL	33.4
DRY WEIGHT	910.8
PROPELLANT	140.2
SATELLITE ADAPTEI	46.7

TOTAL LAUNCH WEIGHT 1097.7

V1-390

BRAZILSAT F/O CC3-1-24

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 24125.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU,
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 458.63 WATTS
TOTAL SOLAR ARRAY AREA 190.77 SQ FT
INSTALLED BATTERY CAPACITY 40.00 AMP-HR
BEGINNING OF LIFE POWER 617.09 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1349.6 LBS (612.2 KG)		LAUNCH WEIGHT = 1414.8 LBS (641.7 KG)	
DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	72.9 IN.(1.85 M)	120.0 IN.(3.05 M)	120.0 IN.(3.05 M)
MISSION EQUIPMENT	20.1 IN.(.51 M)	33.9 IN.(.85 M)	33.5 IN.(.85 M)
TOTAL SATELLITE	93.0 IN.(2.36 M)		
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 457.8		IYY = 2182168.8	IZZ = 2182168.8
CENTER OF GRAVITY 53.4 IN.(1.36 M)		Y-CG 0.0 IN.(0.00 M)	Z-CG 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.1(MO)
RELIABILITY .622

VI-391

BRAZILSAT F/O CC3-1-24

* * . SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL											
CONFIGURATION - - SPIN CONTROL											
EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413					
EQUIPMENT QUANTITIES	1	1	1	2	2	1					
WEIGHT	43.50 LBS										
RELIABILITY		.9618				1.80(FT**3)		POWER REQUIREMENT	10.4 WATTS		
IERR	0										
AUXILIARY PROPULSION											
CONFIGURATION - - MONOPROPELLANT											
EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118	518	701	1203	
EQUIPMENT QUANTITIES	6	2	5	9	2	1	2	1	2	1	
WEIGHT	217.45 LBS										
DRY WEIGHT	72.43(LBS)										
RELIABILITY		.8986						POWER REQUIREMENT	1.0 WATTS		
IERR	11							145.02(LBS)			
DATA PROCESSING AND INSTRUMENTATION											
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)											
EQUIPMENT CODE IDENTIFIER	203	403									
EQUIPMENT QUANTITIES	1	1									
WEIGHT	21.18 LBS										
RELIABILITY		.9668				.39(FT**3)		POWER REQUIREMENT	10.5 WATTS		
IERR	1										
COMMUNICATIONS											
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS											
EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603					
EQUIPMENT QUANTITIES	1	1	2	1	3	1					
WEIGHT	26.12 LBS										
RELIABILITY		.9715				.94(FT**3)		POWER REQUIREMENT	19.5 WATTS		
IERR	*****										
ELECTRICAL POWER											
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY											
EQUIPMENT CODE IDENTIFIER	103	239	315	1202							
EQUIPMENT QUANTITIES	10	2	2	1							
WEIGHT	163.62 LBS										
HARNESS WEIGHT											
RELIABILITY		59.4(LBS)				2.59(FT**3)		POWER DISSIPATION	36.6 WATTS		
		.8520						93.8(LBS)			
MISSION EQUIPMENT											
WEIGHT	260.00 LBS										
RELIABILITY		.9000				10.29(FT**3)		POWER REQUIREMENT	400.0 WATTS		

V1-392

BRAZILSAT F/O CC3-1-24

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	12.9 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)	
HEATER POWER	1257.5 (BTU/HR),	TOTAL RADIATOR AREA	14.3 (FT**2)	
HEAT PIPE	30794.5 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)	
HEAT PIPE LENGTH	5.8 (FT)	TOTAL HEATER POWER	1381.3 (BTU/HR)	
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1203.2 (WATT-IN)	
		AVERAGE HEAT LOAD	1505.5 (BTU/HR)	

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		28.3
HEAT PIPES		6.1
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		8.2
TOTAL		44.4

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.015 (IN)			
STRINGER NO., THICKNESS, HT.	262.		81910.347 (IN),	.483 (IN)
FRAME NO., THICKNESS, HT.	5.		.139 (IN),	.693 (IN)
GRID BEAM THICKNESS	.130 (IN),	SPACING-	3.660 (IN),	HEIGHT- 1.830 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	65.2 (LBS)			

V1-393

BRAZILSAT F/O CC3-1-24

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-394

BRAZILSAT F/O CC3-1-24

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	260.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	93.8
HARNESSES	59.4
STRUCTURE	420.1
THERMAL CONTROL	44.4
DRY WEIGHT	1204.6
PROPELLANT	145.0
SATELLITE ADAPTER	65.2

TOTAL LAUNCH WEIGHT 1414.8

VI-395

NATO F/O CC3-1-26.

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 24125.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
64.
1250

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 478.63 WATTS
TOTAL SOLAR ARRAY AREA 199.09 SQ FT
INSTALLED BATTERY CAPACITY 40.00 AMP-HR
BEGINNING OF LIFE POWER 644.00 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1718.5 LBS (779.5 KG)

LAUNCH WEIGHT = 1799.5 LBS (816.2 KG)

DIMENSIONS

LENGTH
EQUIPMENT BAY 76.0 IN.(1.93 M)
MISSION EQUIPMENT 25.8 IN.(.66 M)
TOTAL SATELLITE 101.9 IN.(2.59 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

HEIGHT
120.0 IN.(3.05 M)
43.1 IN.(1.09 M)
120.0 IN.(3.05 M)
43.1 IN.(1.09 M)

574.3 IYY = 2881804.9 IZZ = 2881804.9

X-CG
CENTER OF GRAVITY 63.3 IN.(1.61 M)

Y-CG
0.0 IN.(0.00 M)
Z-CG
0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.1(MO)
RELIABILITY .622

VI-396

NATO F/O CC3-1-26

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413
EQUIPMENT QUANTITIES	1	1	1	2	2	1
WEIGHT	43.50 LBS	VOLUME		1.80(FT**3)		
RELIABILITY		.9618				
IERR	0					

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118
EQUIPMENT QUANTITIES	6	2	5	9	2	1	2
WEIGHT	217.45 LBS	VOLUME		6.12(FT**3)			
DRY WEIGHT	72.43(LBS)	EXPENDABLE WEIGHT					
RELIABILITY		.8986					
IERR	11						

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
145.02(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403
EQUIPMENT QUANTITIES	1	1
WEIGHT	21.18 LBS	VOLUME
RELIABILITY		.39(FT**3)
IERR	1	

POWER REQUIREMENT 10.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503
EQUIPMENT QUANTITIES	1	1	2	1	3
WEIGHT	26.12 LBS	VOLUME		.94(FT**3)	
RELIABILITY		.9715			
IERR*****					

POWER REQUIREMENT 19.5 WATT

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	103	239	315	1202
EQUIPMENT QUANTITIES	10	2	2	1
WEIGHT	163.62 LBS	VOLUME		2.59(FT**3)
HARNESS WEIGHT		75.8(LBS), SOLAR ARRAY WEIGHT		
RELIABILITY		.8520		

POWER DISSIPATION 38.2 WATTS
97.9(LBS)

MISSION EQUIPMENT

WEIGHT	550.00 LBS	VOLUME	21.75(FT**3)
RELIABILITY		.9000	

POWER REQUIREMENT 420.0 WATTS

41-397

NATO F/O CC3-1-26

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	13.5 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1316.2 (BTU/HR),	TOTAL RADIATOR AREA	14.8 (FT**2)
HEAT PIPE	35263.6 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.4 (FT)	TOTAL HEATER POWER	1440.0 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1318.1 (WATT-IN)
		AVERAGE HEAT LOAD	1573.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	30.7
HEAT PIPES	6.7
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	8.5

TOTAL	47.7

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.017 (IN)		
STRINGER NO., THICKNESS, HT.	244.	81910.347 (IN),	.519 (IN)
FRAME NO., THICKNESS, HT.	5.	.149 (IN),	.745 (IN)
GRID BEAM THICKNESS	.149 (IN),	SPACING 4.184 (IN),	HEIGHT 2.092 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.9 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	81.0 (LBS)		

VI-398

NATO F/O CC3-1-26

* * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUITATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-399

NATO F/D CC3-1-26

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	550.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	97.9
HARNESSES	75.8
STRUCTURE	475.2
THERMAL CONTROL	47.7
DRY WEIGHT	1573.4
PROPELLANT	145.0
SATELLITE ADAPTER	81.0

TOTAL LAUNCH WEIGHT 1799.5

VI 400

ETS IV CC3-1-2{

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = 1.500000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 5235.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 68.51 WATTS
TOTAL SOLAR ARRAY AREA 25.26 SQ FT
INSTALLED BATTERY CAPACITY 6.00 AMP-HR
BEGINNING OF LIFE POWER 81.70 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 350.2 LBS (158.8 KG)

DIMENSIONS LENGTH

EQUIPMENT BAY 30.8 IN.(.78 M)
MISSION EQUIPMENT 10.3 IN.(.26 M)
TOTAL SATELLITE 41.1 IN.(1.04 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

28.4 IYY = 109906.7

IZZ = 109906.7

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 20.3 IN.(.52 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323.7 0.0

MISSION LIFETIME 12.0(MO)

MEAN MISSION DURATION 10.8(MO)

RELIABILITY .724

VI-401

ETS IV CC3-1-28

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 29.28 LBS VOLUME 1.18 (FT**3)
RELIABILITY .9591
IERR 0

POWER REQUIREMENT 9.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116
EQUIPMENT QUANTITIES 6 2 4 9 1 1 1
WEIGHT 84.50 LBS VOLUME 3.80 (FT**3)
DRY WEIGHT 53.03 (LBS), EXPENDABLE WEIGHT
RELIABILITY .9079
IERR 11

506 701 1203 603
1 1 1 1
POWER REQUIREMENT 1.0 WATTS
31.47 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39 (FT**3)
RELIABILITY .9933
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 21.02 LBS VOLUME .87 (FT**3)
RELIABILITY .9595
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 102 202 303 1202
EQUIPMENT QUANTITIES 5 2 2 1
WEIGHT 62.47 LBS VOLUME 1.29 (FT**3)
HARNESS WEIGHT 20.1 (LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9828

POWER DISSIPATION 0.4 WATTS
12.4 (LBS)

MISSION EQUIPMENT

WEIGHT 35.00 LBS VOLUME 1.39 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 28.0 WATTS

VI-402

ETS IV CC3-1-28

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	2.1 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	179.1(BTU/HR),	TOTAL RADIATOR AREA	3.5 (FT**2)
HEAT PIPE	2112.9(WATT-IN),	BATTERY HEATER POWER	122.2(BTU/HR)
HEAT PIPE LENGTH	2.6 (FT)	TOTAL HEATER POWER	301.4(BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	532.0(WATT-IN)
		AVERAGE HEAT LOAD	233.6 (BTU/HR)

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	8.6	
HEAT PIPES	2.7	
PHASE CHANGE MATERIAL	1.8	
RADIATOR (PASSIVE)	1.4	

TOTAL	14.5	

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.009 (IN)			
STRINGER NO., THICKNESS, HT.	225. ,	81910.347 (IN),		.241 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.069 (IN),		.346 (IN)
GRID BEAM THICKNESS	.076 (IN),	SPACING 2.138 (IN),	HEIGHT 1.069 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	60.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	12.9 (LBS)			

V1-403

ETS IV CC3-1-28

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

704-404

ETS IV CC3-1-28

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	5	5.0	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	35.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	21.0
BATTERIES	19.0
POWER CONTROL	43.5
CONVERTERS	15.9
SOLAR ARRAY	12.4
HARNESS	20.1
STRUCTURE	49.7
THERMAL CONTROL	14.5
DRY WEIGHT	318.7
PROPELLANT	31.5
SATELLITE ADAPTER	12.9

TOTAL LAUNCH WEIGHT 363.1

V1-405

CS F/O CC3-1-30

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 18518.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 427.75 WATTS

TOTAL SOLAR ARRAY AREA 176.44 SQ FT

INSTALLED BATTERY CAPACITY 34.00 AMP-HR

BEGINNING OF LIFE POWER 570.74 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1247.9 LBS (566.0 KG)

DIMENSIONS LENGTH

EQUIPMENT RAY 69.7 IN.(1.77 M)

MISSION EQUIPMENT 19.9 IN.(.50 M)

TOTAL SATELLITE 89.5 IN.(2.27 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

395.4 IYY = 1870540.6

IZZ = 1870540.6

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 51.6 IN.(1.31 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 42.0(MO)

MEAN MISSION DURATION 37.2(MO)

RELIABILITY .727

V1-406

CS F/O CC3-1-30

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413

EQUIPMENT QUANTITIES 1 1 1 2 2 1

WEIGHT 43.50 LBS

VOLUME

1.80 (FT**3)

POWER REQUIREMENT

10.4 WATTS

RELIABILITY

.9749

IERR

0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118

EQUIPMENT QUANTITIES 6 2 5 9 1 1 2

WEIGHT 193.57 LBS

VOLUME

5.47 (FT**3)

POWER REQUIREMENT

1.0 WATTS

DRY WEIGHT

82.25 (LBS)

EXPENDABLE WEIGHT

111.31 (LBS)

RELIABILITY

.9105

IERR

11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS

VOLUME

.39 (FT**3)

POWER REQUIREMENT

10.5 WATTS

RELIABILITY

.9766

IERR

1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603

EQUIPMENT QUANTITIES 1 1 2 1 2 1

WEIGHT 24.62 LBS

VOLUME

.92 (FT**3)

POWER REQUIREMENT

19.5 WATTS

RELIABILITY

.9747

IERR*****

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 233 315 1202

EQUIPMENT QUANTITIES 10 2 2 1

WEIGHT 145.91 LBS

VOLUME

2.57 (FT**3)

POWER DISSIPATION

34.1 WATTS

HARNESS WEIGHT

60.0 (LBS)

SOLAR ARRAY WEIGHT

86.7 (LBS)

RELIABILITY

.9561

MISSION EQUIPMENT

WEIGHT 250.00 LBS

VOLUME

9.90 (FT**3)

POWER REQUIREMENT

370.0 WATTS

RELIABILITY

.9000

VI-407

CS F/O CC3-1-30

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	12.0 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1169.5 (BTU/HR),	TOTAL RADIATOR AREA	13.2 (FT**2)
HEAT PIPE	27630.9 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.6 (FT)	TOTAL HEATER POWER	1284.5 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1158.3 (WATT-IN)
		AVERAGE HEAT LOAD	1403.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		26.7
HEAT PIPES		5.9
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		7.6

TOTAL		42.0

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	263.	81910.347 (IN),	.465 (IN)
FRAME NO., THICKNESS, HT.	5.	.134 (IN),	.668 (IN)
GRID BEAM THICKNESS	.125 (IN),	SPACING 3.529 (IN),	HEIGHT 1.764 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	118.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	60.0 (LBS)		

807-11-408

CS F/O CC3-1-30

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTRL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-409

CS F/O CC3-1-30

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	82.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	68.3
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	86.7
HARNESS	60.0
STRUCTURE	380.4
THERMAL CONTROL	42.0
DRY WEIGHT	1136.6
PROPELLANT	111.3
SATELLITE ADAPTER	60.0

TOTAL LAUNCH WEIGHT 1307.9

VI-410

BSE F/O CC3-1-32

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 16916.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 898.47 WATTS
TOTAL SOLAR ARRAY AREA 369.38 SQ FT
INSTALLED BATTERY CAPACITY 72.00 AMP-HR
BEGINNING OF LIFE POWER 1194.83 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1501.3 LBS (681.0 KG)
DIMENSIONS

EQUIPMENT BAY 141.1 IN.(3.58 M)
MISSION EQUIPMENT 19.7 IN.(.50 M)
TOTAL SATELLITE 160.8 IN.(4.08 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

489.3 IYY = 6376419.7

IZZ = 6376419.7

CENTER OF GRAVITY 104.8 IN.(2.66 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 36.0(MO)
MEAN MISSION DURATION 31.1(MO)
RELIABILITY .705

V-411

BSE F70 CC3-1-31

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43(FT**3)
RELIABILITY .9432
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1124
EQUIPMENT QUANTITIES 6 2 5 9 1 1 1
WEIGHT 156.25 LBS VOLUME 4.98(FT**3)
DRY WEIGHT 56.98(LBS), EXPENDABLE WEIGHT
RELIABILITY .9462
IERR 11

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
99.28(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9799
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9791
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 112 263 389 1202
EQUIPMENT QUANTITIES 12 2 2 1
WEIGHT 164.90 LBS VOLUME 1.61(FT**3)
HARNESS WEIGHT 47.1(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9146

POWER DISSIPATION 71.7 WATTS
181.6(LBS)

MISSION EQUIPMENT

WEIGHT 245.00 LBS VOLUME 9.70(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 845.0 WATTS

VI-412

BSE F/O CC3-1-32

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	25.9 (FT**2),	BATTERY RADIATOR AREA	.6 (FT**2)
HEATER POWER	2560.2 (BTU/HR),	TOTAL RADIATOR AREA	26.5 (FT**2)
HEAT PIPE	106935.8 (WATT-IN),	BATTERY HEATER POWER	42.6 (BTU/HR)
HEAT PIPE LENGTH	10.1 (FT)	TOTAL HEATER POWER	2602.8 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	2080.7 (WATT-IN)
		AVERAGE HEAT LOAD	3020.3 (BTU/HR)

THERMAL CONTROL WEIGHT	
	UNIT WEIGHT (LBS)
INSULATION	46.1
HEAT PIPES	10.6
PHASE CHANGE MATERIAL	1.8
RADIATOR (ACTIVE)	57.0

TOTAL	115.4

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.018 (IN)		
STRINGER NO., THICKNESS, HT.	237.	81910.347 (IN),	.533 (IN)
FRAME NO., THICKNESS, HT.	9.	.153 (IN),	.766 (IN)
GRID BEAM THICKNESS	.129 (IN),	SPACING 3.635 (IN),	HEIGHT 1.818 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	124.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	74.6 (LBS)		

VI-413

BSE F/O CC3-1-32

* * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	Nº.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	Nº.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATOR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	Nº.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	Nº.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND.	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-414

RSE F/D CC3-1-32

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	QTY	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	12	1.4	.0	0.0
263	BATTERY	2	63.3	.5	0.0
389	BATTERY CHARGER	2	5.3	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	245.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	57.0
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	126.5
POWER CONTROL	38.4
CONVERTERS	15.9
SOLAR ARRAY	181.6
HARNESS	47.1
STRUCTURE	509.2
THERMAL CONTROL	115.4
DRY WEIGHT	1402.1
PROPELLANT	99.3
SATELLITE ADAPTER	74.6

TOTAL LAUNCH WEIGHT 1575.9

VI-415

EXP COMM SAT (ECS) CC3-1-33

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .250000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 18518.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 316.25 WATTS
TOTAL SOLAR ARRAY AREA 130.45 SQ FT
INSTALLED BATTERY CAPACITY 28.00 AMP-HR
BEGINNING OF LIFE POWER 421.97 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1000.8 LBS (453.9 KG)

LAUNCH WEIGHT = 1045.7 LBS (474.3 KG)

DIMENSIONS

EQUIPMENT BAY 59.9 IN.(1.52 M)
MISSION EQUIPMENT 18.0 IN.(.46 M)
TOTAL SATELLITE 77.9 IN.(1.98 M)

HEIGHT 99.8 IN.(2.54 M) 99.8 IN.(2.54 M)
WIDTH 30.0 IN.(.76 M) 30.0 IN.(.76 M)

MOMENTS OF INERTIA (SLUGS*FT*2) IXX =

252.6 IYY = 1164361.9 IZZ = 1164361.9

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 43.0 IN.(1.09 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

✓APOGEE/PERIGEE/INCLINATION 19323./19323.° 0.0

MISSION LIFETIME 42.0(MO)

MEAN MISSION DURATION 36.9(MO)

RELIABILITY .716

VI-416

EXP COMM SAT (ECS) CC3-1-33

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

✓ CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1415
EQUIPMENT QUANTITIES 1 1 1 1 2 1
WEIGHT 36.10 LBS VOLUME 1.43 (FT**3)
RELIABILITY .9337
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 193.57 LBS VOLUME 5.47 (FT**3)
DRY WEIGHT 82.25 (LBS), EXPENDABLE WEIGHT
RELIABILITY .9105
IERR 11

515 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
111.31 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39 (FT**3)
RELIABILITY .9766
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92 (FT**3)
RELIABILITY .9747
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 224 306 1202
EQUIPMENT QUANTITIES 8 2 2 1
WEIGHT 128.99 LBS VOLUME 2.21 (FT**3)
HARNESS WEIGHT 49.3 (LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9828

POWER DISSIPATION 25.2 WATTS
64.1 (LBS)

MISSION EQUIPMENT

WEIGHT 185.00 LBS VOLUME 7.32 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 262.0 WATTS

71-417

EXP COMM SAT (ECS) CC3-1-33

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA

8.9 (FT**2),

HEATER POWER 852.8 (BTU/HR),

HEAT PIPE 17725.4 (WATT-IN),

HEAT PIPE LENGTH 4.9 (FT)

STORED ENERGY 72.1 (BTU)

BATTERY RADIATOR AREA

TOTAL RADIATOR AREA

BATTERY HEATER POWER

TOTAL HEATER POWER

VARIABLE CONDUCTANCE H.P.

AVERAGE HEAT LOAD

1.2 (FT**2)

10.0 (FT**2)

115.0 (BTU/HR)

967.8 (BTU/HR)

1007.4 (WATT-IN)

1035.0 (BTU/HR)

THERMAL CONTROL WEIGHT

UNIT WEIGHT (LBS)

INSULATION 21.0

HEAT PIPES 5.1

PHASE CHANGE MATERIAL 1.8

RADIATOR (PASSIVE) 5.6

TOTAL 33.5

IERR 1100010111

STRUCTURES

SKIN THICKNESS .013 (IN)

STRINGER NO., THICKNESS, HT. 253.

FRAME NO., THICKNESS, HT. 5.

GRID BEAM THICKNESS .116 (IN)

ENDCOVER THICKNESS- FORWARD .030 (IN)

EQUIPMENT BAY STRUCTURE WT. 111.3 (LBS)

SOLAR ARRAY BOOM AND DRIVE WT. 0.0 (LBS)

ADAPTER WEIGHT 44.9 (LBS)

253.

5.

.116 (IN)

.030 (IN)

111.3 (LBS)

0.0 (LBS)

44.9 (LBS)

81910.347 (IN)

.119 (IN)

3.278 (IN)

0.000 (IN)

CENTER

SPACING

HEIGHT

AFT

.416 (IN)

.597 (IN)

1.639 (IN)

.030 (IN)

817-1A

EXP COMM SAT (ECS) CC3-1-33

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓834	THRUSTER	6	.7	.0	.1
✓834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓203	DIGITAL TELEMETRY	1	8.9	.2	3.0
✓403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-419

EXP COMM SAT (ECS) CC3-1-33

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
✓224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
-MISSION EQUIPMENT	185.0
-STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	82.3
DATA PROCESSING	21.2
-COMMUNICATIONS	24.6
-BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	64.1
HARNES	49.3
-STRUCTURE	264.4
THERMAL CONTROL	33.5
DRY WEIGHT	889.5
PROPELLANT	111.3
SATELLITE ADAPTER	44.9

TOTAL LAUNCH WEIGHT 1045.7

V1-420

TELESAT-C CC3-1-35

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION -- SPIN CONTROL
 POINTING ACCURACY = .400000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 26175.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.(IPS)
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)
 ELECTRICAL POWER
 CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 478.64 WATTS
 TOTAL SOLAR ARRAY AREA 199.09 SQ FT
 INSTALLED BATTERY CAPACITY 40.00 AMP-HR
 BEGINNING OF LIFE POWER 644.01 WATTS
 VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 WET SATELLITE WEIGHT = 1733.7 LBS (786.4 KG) LAUNCH WEIGHT = 1815.1 LBS (823.3 KG)
 DIMENSIONS

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	76.0 IN.(1.93 M)	120.0 IN.(3.05 M)	120.0 IN.(3.05 M)
MISSION EQUIPMENT	25.8 IN.(.66 M)	43.1 IN.(1.09 M)	43.1 IN.(1.09 M)
TOTAL SATELLITE	101.9 IN.(2.59 M)		

MOMENTS OF INERTIA (SLUGS*FT*2) IXX = 581.9 IYY = 2917439.7 IZZ = 2917439.7
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 63.0 IN.(1.60 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)
 RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
 MISSION LIFETIME 60.0(MO)
 MEAN MISSION DURATION 50.2(MO)
 RELIABILITY .624

V1-421

TELESAT-C CC3-1-35

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 2 1 2 2 1
WEIGHT 43.80 LBS VOLUME 1.82(FT**3)
RELIABILITY .9638
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 2 1 2
WEIGHT 229.78 LBS VOLUME 6.12(FT**3)
DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT
RELIABILITY .8986
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
157.34(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 3 1
WEIGHT 26.12 LBS VOLUME .94(FT**3)
RELIABILITY .9715
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 239 315 1202
EQUIPMENT QUANTITIES 10 2 2 1
WEIGHT 163.62 LBS VOLUME 2.59(FT**3)
HARNESS WEIGHT 75.9(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .8520

POWER DISSIPATION 38.2 WATTS
97.9(LBS)

MISSION EQUIPMENT

WEIGHT 550.00 LBS VOLUME 21.75(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 420.0 WATTS

VI-422

TELESAT-C CC3-1-35

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	13.5 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1316.2 (BTU/HR),	TOTAL RADIATOR AREA	14.8 (FT**2)
HEAT PIPE	35264.1 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.4 (FT)	TOTAL HEATER POWER	1440.0 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1318.1 (WATT-IN)
		AVERAGE HEAT LOAD	1573.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	30.7
HEAT PIPES	6.7
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	8.5
TOTAL	47.7

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.017 (IN)			
STRINGER NO., THICKNESS, HT.	243.		81910.347 (IN),	.521 (IN)
FRAME NO., THICKNESS, HT.	5.		.149 (IN),	.747 (IN)
GRID BEAM THICKNESS	.149 (IN),	SPACING	4.210 (IN),	HEIGHT 2.105 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	134.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	81.5 (LBS)			

V1-423

TELESAT-C CC3-1-35

* * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-424

TELESAT-C CC3-1-35

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	550.0
STABILITY AND CONTROL	27.9
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	97.9
HARNESS	75.9
STRUCTURE	477.7
THERMAL CONTROL	47.7
DRY WEIGHT	1576.3
PROPELLANT	157.3
SATELLITE ADAPTER	81.5

TOTAL LAUNCH WEIGHT 1015.1

V1-425

TELESAT-D CC3-1-36

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
 CONFIGURATION - - SPIN CONTROL
 POINTING ACCURACY = .400000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION - - MONOPROPELLANT
 TOTAL IMPULSE = 23324.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE 0.(IPS)
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)
 ELECTRICAL POWER
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 207.75 WATTS
 TOTAL SOLAR ARRAY AREA 87.54 SQ FT
 INSTALLED BATTERY CAPACITY 18.00 AMP-HR
 BEGINNING OF LIFE POWER 283.17 WATTS
 VEHICLE SIZING
 CONFIGURATION - - CYLINDER
 WET SATELLITE WEIGHT = 958.5 LBS (434.8 KG) LAUNCH WEIGHT = 998.2 LBS (452.8 KG)
 DIMENSIONS LENGTH HEIGHT WIDTH
 EQUIPMENT BAY 49.1 IN.(1.25 M) 81.8 IN.(2.08 M) 81.8 IN.(2.08 M)
 MISSION EQUIPMENT 20.9 IN.(.53 M) 34.8 IN.(.88 M) 34.8 IN.(.88 M)
 TOTAL SATELLITE 69.9 IN.(1.78 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 172.9 IYY = 819799.3 IZZ = 819799.3
 X-CG Y-CG Z-CG
 CENTER OF GRAVITY 39.2 IN.(1.00 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)
 RELIABILITY
 CONFIGURATION - - SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
 MISSION LIFETIME .0(MO)
 MEAN MISSION DURATION .4(MO)
 RELIABILITY .627

V1-426

TELESAT-D CC3-1-36

*** SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80 (FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72 (FT**3)
DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT
RELIABILITY .8254
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39 (FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92 (FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 213 303 1202
EQUIPMENT QUANTITIES 6 2 2 1
WEIGHT 78.11 LBS VOLUME 1.38 (FT**3)
HARNESS WEIGHT 42.1 (LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9451

POWER DISSIPATION 19.5 WATTS
43.0 (LBS)

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48 (FT**3)
RELIABILITY .9000

POWER REQUIREMENT 150.0 WATTS

V1-427

TELESAT-D CC3-1-36

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	5.6 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	524.4(BTU/HR),	TOTAL RADIATOR AREA	6.8 (FT**2)
HEAT PIPE	10045.8(WATT-IN),	BATTERY HEATER POWER	113.9(BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	638.3(BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	904.9(WATT-IN)
		AVERAGE HEAT LOAD	653.0 (BTU/HR)

THERMAL CONTROL WEIGHT	
	UNIT WEIGHT (LBS)
INSULATION	16.5
HEAT PIPES	4.6
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	3.5

TOTAL	26.4

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.014 (IN)			
STRINGER NO., THICKNESS, HT.	226.			
FRAME NO., THICKNESS, HT.	5.			
GRID BEAM THICKNESS	.119 (IN),	81910.347 (IN),		.381 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	.109 (IN),		.547 (IN)
EQUIPMENT BAY STRUCTURE WT.	103.5 (LBS)	SPACING 3.358 (IN),	HEIGHT 1.679 (IN)	
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)	CENTER 0.000 (IN),	AFT .030 (IN)	
ADAPTER WEIGHT	39.7 (LBS)			

V1-428

TELESAT-D CC3-1-36

*** ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-429

TELESAT-D CC3-1-36

*** ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	34.4
POWER CONTROL	43.7
CONVERTERS	15.9
SOLAR ARRAY	43.0
HARNESS	42.1
STRUCTURE	181.1
THERMAL CONTROL	26.4
DRY WEIGHT	818.3
PROPELLANT	140.2
SATELLITE ADAPTER	39.7

TOTAL LAUNCH WEIGHT 998.2

N1-430

TELESAT F/O CC3-1-37

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION -- SPIN CONTROL
 POINTING ACCURACY = .400000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 26175.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR
 COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
 256.
 13.
 8.
 18.
 .1250
 64.

MISSION EQUIPMENT DATA

0.
 0.
 0.
 0.
 0.
 0.0000
 0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 506.64 WATTS
 TOTAL SOLAR ARRAY AREA 210.74 SQ FT
 INSTALLED BATTERY CAPACITY 40.00 AMP-HR
 BEGINNING OF LIFE POWER 681.68 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1761.6 LBS (799.0 KG)

LAUNCH WEIGHT = 1844.4 LBS (836.6 KG)

DIMENSIONS

EQUIPMENT BAY 80.5 IN.(2.04 M)

120.0 IN.(3.05 M)

120.0 IN.(3.05 M)

MISSION EQUIPMENT 26.0 IN.(.66 M)

43.3 IN.(1.10 M)

43.3 IN.(1.10 M)

TOTAL SATELLITE 106.5 IN.(2.70 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

591.2 IYY = 3145297.1

IZZ = 3145297.1

CENTER OF GRAVITY 66.6 IN.(1.69 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 50.0(MO)

RELIABILITY .622

VI-431

TELESAT F/D CC3-1-37

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413
EQUIPMENT QUANTITIES 1 2 1 2 3 1
WEIGHT 39.54 LBS VOLUME 1.62(FT**3)
RELIABILITY .9690
IERR 0

POWER REQUIREMENT 9.4 WAT1

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 2 1 2
WEIGHT 229.78 LBS VOLUME 6.12(FT**3)
DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT
RELIABILITY .8986
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WAT1
157.34(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WAT1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 3 1
WEIGHT 26.12 LBS VOLUME .94(FT**3)
RELIABILITY .9715
IERR*****

POWER REQUIREMENT 19.5 WAT1

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 239 315 1202
EQUIPMENT QUANTITIES 11 2 2 1
WEIGHT 167.82 LBS VOLUME 2.72(FT**3)
HARNESS WEIGHT 77.1(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .8446

POWER DISSIPATION 40.4 WAT1
103.6(LBS)

MISSION EQUIPMENT

WEIGHT 560.00 LBS VOLUME 22.15(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 450.0 WAT1

V1-432

TELESAT F/D CC3-1-37

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	14.3 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1401.2 (BTU/HR),	TOTAL RADIATOR AREA	15.7 (FT**2)
HEAT PIPE	39173.8 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.7 (FT)	TOTAL HEATER POWER	1525.0 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	1377.6 (WATT-IN)
		AVERAGE HEAT LOAD	1672.6 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	31.9
HEAT PIPES	7.0
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	9.1
TOTAL	49.7

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.018 (IN)		
STRINGER NO., THICKNESS, HT.	240.	81910.347 (IN),	.526 (IN)
FRAME NO., THICKNESS, HT.	6.	.151 (IN),	.756 (IN)
GRID BEAM THICKNESS	.150 (IN),	SPACING 4.238 (IN),	HEIGHT 2.119 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	135.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	82.8 (LBS)		

VI-433

TELESAT F/O CC3-1-37

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
803	EARTH SENSOR	3	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-434

TELESAT F/O CC3-1-37

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	11	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	560.0
STABILITY AND CONTROL	23.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	81.8
CONVERTERS	15.9
SOLAR ARRAY	103.6
HARNESS	77.1
STRUCTURE	486.7
THERMAL CONTROL	49.7
DRY WEIGHT	1604.2
PROPELLANT	157.3
SATELLITE ADAPTER	82.8

TOTAL LAUNCH WEIGHT 1844.4

VI-435

CANADIAN DIRECT BROADCAST CC3-1-39

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
 POINTING ACCURACY = .200000(DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION - - MONOPROPELLANT
 TOTAL IMPULSE = 47991.(LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0.(IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPT TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)
 ELECTRICAL POWER
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - - PADDLE MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 970.92 WATTS
 TOTAL SOLAR ARRAY AREA 111.06 SQ FT
 INSTALLED BATTERY CAPACITY 132.00 AMP-HR
 BEGINNING OF LIFE POWER 1414.15 WATTS

VEHICLE SIZING
 CONFIGURATION - - CYLINDER
 WET SATELLITE WEIGHT = 1752.4 LBS (794.9 KG) LAUNCH WEIGHT = 1816.2 LBS (823.8 KG)
 DIMENSIONS
 EQUIPMENT BAY 40.5 IN. (1.03 M) 67.5 IN. (1.71 M) 67.5 IN. (1.71 M)
 MISSION EQUIPMENT 25.7 IN. (.65 M) 42.8 IN. (1.09 M) 42.8 IN. (1.09 M)
 TOTAL SATELLITE 66.2 IN. (1.68 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 376.0 IYY = 1068487.8 IZZ = 1877025.9
 CENTER OF GRAVITY 33.5 IN. (.85 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
 CONFIGURATION - - SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
 MISSION LIFETIME 60.0(MO)
 MEAN MISSION DURATION 49.8(MO)
 RELIABILITY .605

VI-436

CANADIAN DIRECT BRDCST CC3-1-39

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303			
EQUIPMENT QUANTITIES	2	2	2	2			
WEIGHT	58.40	LBS			VOLUME	1.77(FT**3)	POWER REQUIREMENT 78.9 WATTS
RELIABILITY			.9856				
IERR	10						

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	813	834	907	1003	499	203	1130	509	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	2	1	2	1	1
WEIGHT	368.89	LBS			VOLUME	10.45(FT**3)		POWER REQUIREMENT .3 WATTS			
DRY WEIGHT	98.03	(LBS)			EXPENDABLE WEIGHT	270.85	(LBS)				
RELIABILITY			.8862								
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403				
EQUIPMENT QUANTITIES	1	1				
WEIGHT	21.18	LBS		VOLUME	.39(FT**3)	POWER REQUIREMENT 10.5 WATTS
RELIABILITY			.9668			
IERR	1					

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	106	327	401	503	605
EQUIPMENT QUANTITIES	1	2	2	2	3	2
WEIGHT	35.64	LBS		VOLUME	1.05(FT**3)	POWER REQUIREMENT 25.5 WATTS
RELIABILITY			.9897			
IERR	*****					

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	406	530	260	650	702	
EQUIPMENT QUANTITIES	4	11	4	4	1	
WEIGHT	301.09	LBS		VOLUME	3.46(FT**3)	POWER DISSIPATION 163.9 WATTS
HARNESS WEIGHT			75.0	(LBS), SOLAR ARRAY WEIGHT	77.3	(LBS)
RELIABILITY			.8044			

MISSION EQUIPMENT

WEIGHT	540.00	LBS		VOLUME	21.36(FT**3)	POWER REQUIREMENT 750.0 WATTS
RELIABILITY			.9000			

VI-437

CANADIAN DIRECT BRDCST CC3-1-39

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	29.5 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2818.9(BTU/HR),	TOTAL RADIATOR AREA	30.4 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	90.0(BTU/HR)
HEAT PIPE LENGTH	4.1 (FT)	TOTAL HEATER POWER	2908.9(BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	669.8(WATT-IN)
		AVERAGE HEAT LOAD	2950.1 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		13.7
HEAT PIPES		4.3
PHASE CHANGE MATERIAL		2.6
RADIATOR (ACTIVE)		62.2

TOTAL		82.9

IERR 1100001011

STRUCTURES							
SKIN THICKNESS	.019 (IN)	174.		81910.347 (IN),		.409 (IN)	
STRINGER NO., THICKNESS, HT.		5.		.117 (IN),		.587 (IN)	
FRAME NO., THICKNESS, HT.		.166 (IN),		4.687 (IN),		2.344 (IN)	
GRID BEAM THICKNESS		.030 (IN),		0.000 (IN),		.030 (IN)	
ENDCOVER THICKNESS- FORWARD		158.9 (LBS)					
EQUIPMENT BAY STRUCTURE WT.		28.0 (LBS)					
SOLAR ARRAY BOOM AND DRIVE WT.		63.8 (LBS)					
ADAPTER WEIGHT							

V1-438

CANADIAN DIRECT BRDCST CC3-1-39

* * * ASSEMBLY DESCRIPTIONS DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
934	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

V1-439

CANADIAN DIRECT BRDCST CC3-1-39

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
530	SHUNT REGULATOR	11	2.2	.0	0.0
260	BATTERY	4	47.5	.2	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	540.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	98.0
DATA PROCESSING	21.2
COMMUNICATIONS	35.6
BATTERIES	190.1
POWER CONTROL	111.0
SOLAR ARRAY	77.3
HARNESS	75.0
STRUCTURE	179.1
SOLAR ARRAY DRIVE	12.8
THERMAL CONTROL	82.9
DRY WEIGHT	1481.5
PROPELLANT	270.9
SATELLITE ADAPTER	63.8

TOTAL LAUNCH WEIGHT 1816.2

VI-446

DISASTER WARNING CS1-1-1

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 48132.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
125.
8.
4.
1.0000
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
POWER REQUIREMENT 2881.92 WATTS
TOTAL SOLAR ARRAY AREA 329.67 SQ FT
INSTALLED BATTERY CAPACITY 400.00 AMP-HR
BEGINNING OF LIFE POWER 4197.53 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 2691.5 LBS (1220.8 KG)

DIMENSIONS

EQUIPMENT BAY 45.3 IN.(1.15 M)
MISSION EQUIPMENT 25.0 IN.(.64 M)
TOTAL SATELLITE 70.3 IN.(1.79 M)

MOMENTS OF INERTIA (SLUGS*FT**2)

IXX = 2321.7
X-CG 33.5 IN.(.85 M)

LAUNCH WEIGHT = 2783.8 LBS (1262.7 KG)

HEIGHT

75.4 IN.(1.92 M)
41.7 IN.(1.06 M)

WIDTH

75.4 IN.(1.92 M)
41.7 IN.(1.06 M)

IYY = 1862565.2
IYY = 1862565.2
IZZ = 10916960.9

Y-CG 0.0 IN.(0.00 M)

Z-CG

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 49.5(MO)
RELIABILITY .605

V1-441

DISASTER WARNING CS1-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 3 2 2 2

WEIGHT 60.00 LBS VOLUME 1.93(FT**3)

RELIABILITY .9903

IERR .10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 2 1 2

WEIGHT 369.69 LBS VOLUME 10.45(FT**3)

DRY WEIGHT 98.03(LBS), EXPENDABLE WEIGHT

RELIABILITY .9157

IERR 1

509 701 1203 603
1 2 1 1
POWER REQUIREMENT 271.65(LBS)

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME .39(FT**3)

RELIABILITY .9668

IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 3 2 2 3 2

WEIGHT 37.64 LBS VOLUME 1.08(FT**3)

RELIABILITY .9949

IERR*****

POWER REQUIREMENT 25.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 532 269 650 702

EQUIPMENT QUANTITIES 8 11 8 8 2

WEIGHT 868.98 LBS VOLUME 10.11(FT**3)

HARNESS WEIGHT 125.8(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .7710

POWER DISSIPATION 486.6 WATTS
229.6(LBS)

MISSION EQUIPMENT

WEIGHT 500.00 LBS VOLUME 19.78(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 2660.0 WATTS

V1-442

DISASTER WARNING CS1-1-1

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	94.7 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	9189.1 (BTU/HR),	TOTAL RADIATOR AREA	95.6 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	9279.1 (BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	711.7 (WATT-IN)
		AVERAGE HEAT LOAD	9463.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		15.6
HEAT PIPES		4.6
PHASE CHANGE MATERIAL		2.6
RADIATOR (ACTIVE)		155.4
TOTAL		178.2

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.023 (IN)		
STRINGER NO., THICKNESS, HT.	166.	81910.347 (IN),	.480 (IN)
FRAME NO., THICKNESS, HT.	5.	.138 (IN),	.690 (IN)
GRID BEAM THICKNESS	.206 (IN),	SPACING 5.790 (IN),	HEIGHT 2.895 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	273.7 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	53.3 (LBS)		
ADAPTER WEIGHT	92.4 (LBS)		

V1-443

DISASTER WARNING CS1-1-1

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-444

DISASTER WARNING CS1-1-1

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	8	16.4	.4	0.0
532	SHUNT REGULATOR	11	6.5	.1	0.0
269	BATTERY	8	71.3	.4	0.0
650	BATTERY CHARGER	8	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	500.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	98.0
DATA PROCESSING	21.2
COMMUNICATIONS	37.6
BATTERIES	570.2
POWER CONTROL	298.7
SOLAR ARRAY	229.6
HARNES	125.8
STRUCTURE	262.3
SOLAR ARRAY DRIVE	38.1
THERMAL CONTROL	178.2
DRY WEIGHT	2419.8
PROPELLANT	271.7
SATELLITE ADAPTER	92.4

TOTAL LAUNCH WEIGHT 2783.8

V1-445

INMARSAT CS2-1-1

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

CDFI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.

256.

13.

8.

18.

.1250

64.

MISSION EQUIPMENT DATA

0.

0.

0.

0.

0.

0.0000

0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

POWER REQUIREMENT 387.75 WATTS

TOTAL SOLAR ARRAY AREA 161.29 SQ FT

INSTALLED BATTERY CAPACITY 34.00 AMP-HR

BEGINNING OF LIFE POWER 521.72 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WEI SATELLITE WEIGHT = 1154.9 LBS (523.9 KG)

LAUNCH WEIGHT = 1209.1 LBS (548.4 KG)

DIMENSIONS LENGTH

HEIGHT

WIDTH

EQUIPMENT BAY 66.6 IN. (1.69 M)

111.0 IN. (2.82 M)

111.0 IN. (2.82 M)

MISSION EQUIPMENT 18.6 IN. (.47 M)

31.0 IN. (.79 M)

31.0 IN. (.79 M)

TOTAL SATELLITE 85.2 IN. (2.16 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

347.1 IYY = 1615038.4

IZZ = 1615038.4

CENTER OF GRAVITY 47.8 IN. (1.21 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 51.0(MO)

RELIABILITY .616

VI-446

INMARSAT CS2-1-1

* * SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80(FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 1 1 2
WEIGHT 208.54 LBS VOLUME 5.72(FT**3)
DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT
RELIABILITY .8260
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
140.20(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 2 1
WEIGHT 24.62 LBS VOLUME .92(FT**3)
RELIABILITY .9601
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 233 315 1202
EQUIPMENT QUANTITIES 9 2 2 1
WEIGHT 141.71 LBS VOLUME 2.44(FT**3)
HARNESS WEIGHT 51.8(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9275

POWER DISSIPATION 30.9 WATTS
79.3(LBS)

MISSION EQUIPMENT

WEIGHT 205.00 LBS VOLUME 8.12(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 330.0 WATTS

VI-447

IMARSAT CS2-1-1

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	10.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1052.2 (BTU/HR),	TOTAL RADIATOR AREA	12.0 (FT**2)
HEAT PIPE LENGTH	23738.9 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE	5.3 (FT)	TOTAL HEATER POWER	1167.2 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1102.2 (WATT-IN)
		AVERAGE HEAT LOAD	1266.8 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	24.6
HEAT PIPES	5.6
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	6.9
TOTAL	38.9

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.014 (IN)			
STRINGER NO., THICKNESS, HT.	260.		81910.347 (IN),	.449 (IN)
FRAME NO., THICKNESS, HT.	5.		.129 (IN),	.645 (IN)
GRID BEAM THICKNESS	.122 (IN),	SPACING	3.440 (IN),	HEIGHT 1.720 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	120.9 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	54.2 (LBS)			

VI-448

C-4

INMARSAT CS2-1-1

* * * ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIFLEXER	1	3.1	.0	1.0

677-1A

IAMARSAT CS2-1-1

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER			
IDENT	TYPE	NO.	UNIT WEIGHT UNIT VOLUME UNIT POWER
103	SHUNT REGULATOR	9	4.2 .1 0.0
233	BATTERY	2	34.2 .2 0.0
315	BATTERY CHARGER	2	12.0 .3 0.0
1202	POWER CONTROL	1	11.6 .3 0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	205.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	68.3
POWER CONTROL	73.4
CONVERTERS	15.9
SOLAR ARRAY	79.3
HARNESS	51.8
STRUCTURE	340.4
THERMAL CONTROL	38.9
DRY WEIGHT	1014.7
PROPELLANT	140.2
SATELLITE ADAPTER	54.2

TOTAL LAUNCH WEIGHT 1209.1

VI-450

INMARSAT F/O CS2-1-2

* * * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT
TOTAL IMPULSE = 24125.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
64.	0.0000

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 458.63 WATTS
TOTAL SOLAR ARRAY AREA 190.77 SQ FT
INSTALLED BATTERY CAPACITY 40.00 AMP-HR
BEGINNING OF LIFE POWER 617.09 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER
WET SATELLITE WEIGHT = 1337.1 LBS (606.5 KG) LAUNCH WEIGHT = 1401.8 LBS (635.8 KG)
DIMENSIONS
EQUIPMENT BAY 72.9 IN.(1.85 M) 120.0 IN.(3.05 M) 120.0 IN.(3.05 M)
MISSION EQUIPMENT 19.9 IN.(.50 M) 33.1 IN.(.84 M) 33.1 IN.(.84 M)
TOTAL SATELLITE 92.7 IN.(2.36 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 453.9 IYY = 2161411.9 IZZ = 2161411.9

CENTER OF GRAVITY 53.1 IN.(1.35 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 60.0(MO)
MEAN MISSION DURATION 50.1(MO)
RELIABILITY .622

V1-451

INMARSAT F/U CS2-1-2

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413
EQUIPMENT QUANTITIES 1 1 1 2 2 1
WEIGHT 43.50 LBS VOLUME 1.80(FT**3)
RELIABILITY .9618
IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118
EQUIPMENT QUANTITIES 6 2 5 9 2 1 2
WEIGHT 217.45 LBS VOLUME 6.12(FT**3)
DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT
RELIABILITY .8986
IERR 11

518 701 1203 603
1 2 1 1
POWER REQUIREMENT 1.0 WATTS
145.02(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9668
IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 2 1 3 1
WEIGHT 26.12 LBS VOLUME .94(FT**3)
RELIABILITY .9715
IERR*****

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 239 315 1202
EQUIPMENT QUANTITIES 10 2 2 1
WEIGHT 163.62 LBS VOLUME 2.59(FT**3)
HARNESS WEIGHT 58.9(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .8520

POWER DISSIPATION 36.6 WATTS
93.8(LBS)

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 400.0 WATTS

V1-452

INMARSAT F/D CS2-1-2

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	12.9 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1257.5 (BTU/HR),	TOTAL RADIATOR AREA	14.3 (FT**2)
HEAT PIPE	30708.0 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	5.8 (FT)	TOTAL HEATER POWER	1381.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1199.8 (WATT-IN)
		AVERAGE HEAT LOAD	1505.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	28.3
HEAT PIPES	6.1
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	8.2
TOTAL	44.3

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.015 (IN)			
STRINGER NO., THICKNESS, HT.	263.		81910.347 (IN),	.481 (IN)
FRAME NO., THICKNESS, HT.	5.		.138 (IN),	.691 (IN)
GRID BEAM THICKNESS	.129 (IN),	SPACING	3.641 (IN),	HEIGHT 1.821 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	64.7 (LBS)			

V1-453

IMARSAT F/D CS2-1-2

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-454

INMARSAT F/D CS2-1-2

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	93.8
HARNES	58.9
STRUCTURE	418.3
THERMAL CONTROL	44.3
DRY WEIGHT	1192.1
PROPELLANT	145.0
SATELLITE ADAPTER	64.7

TOTAL LAUNCH WEIGHT 1401.8

V1-455

INATSAT CS2-1-3

* * SYSTEM DESCRIPTION - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL
 POINTING ACCURACY = .300000 (DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION - - MONOPROPELLANT
 TOTAL IMPULSE = 38388. (LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPT TABLE

NUMBER OF COMMANDS
 NUMBER OF MAIN FRAME WORDS
 MAIN FRAME SAMPLE RATE
 MAIN FRAME WORD LENGTH
 NUMBER OF SUBFRAMES
 SUBFRAME RATE
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
 64.
 16.
 8.
 3.
 1.0000
 32.

MISSION EQUIPMENT DATA

0.
 128.
 100.
 8.
 2.
 1.0000
 64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 520.28 WATTS
 TOTAL SOLAR ARRAY AREA 59.52 SQ FT
 INSTALLED BATTERY CAPACITY 66.00 AMP-HR
 BEGINNING OF LIFE POWER 757.79 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1323.2 LBS (600.2 KG)

LAUNCH WEIGHT = 1373.8 LBS (623.2 KG)

DIMENSIONS

EQUIPMENT BAY 39.3 IN. (1.00 M)

65.4 IN. (1.66 M)

65.4 IN. (1.66 M)

MISSION EQUIPMENT 24.2 IN. (.61 M)

40.3 IN. (1.02 M)

40.3 IN. (1.02 M)

TOTAL SATELLITE 63.4 IN. (1.61 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

204.1 IYY = 763741.9

IZZ = 1029482.0

CENTER OF GRAVITY 33.0 IN. (.84 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0 (MO)

MEAN MISSION DURATION 49.4 (MO)

RELIABILITY .1604

V1-456

INATSAT CS2-1-3

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 42.00 LBS VOLUME 1.24(FT**3)

RELIABILITY .9418

IERR 10

POWER REQUIREMENT

78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603

EQUIPMENT QUANTITIES 18 6 5 9 2 1 2 1 2 1 1

WEIGHT 313.15 LBS VOLUME 10.15(FT**3)

DRY WEIGHT 95.03(LBS), EXPENDABLE WEIGHT 218.11(LBS)

RELIABILITY .8866

IERR 11

POWER REQUIREMENT

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403

EQUIPMENT QUANTITIES 1 1 1

WEIGHT 30.11 LBS VOLUME .54(FT**3)

RELIABILITY .9505

IERR 2

POWER REQUIREMENT

13.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312

EQUIPMENT QUANTITIES 1 1 2 1 3 1 1 2

WEIGHT 38.92 LBS VOLUME 1.70(FT**3)

RELIABILITY .9683

IERR*****

POWER REQUIREMENT

35.4 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 260 650 702

EQUIPMENT QUANTITIES 2 7 2 2 1

WEIGHT 155.35 LBS VOLUME 1.98(FT**3)

HARNESS WEIGHT 58.5(LBS), SOLAR ARRAY WEIGHT 41.4(LBS)

RELIABILITY .8727

POWER DISSIPATION

87.8 WATTS

MISSION EQUIPMENT

WEIGHT 450.00 LBS

VOLUME

17.80(FT**3)

POWER REQUIREMENT

300.0 WATTS

RELIABILITY

.9000

V1-457

INATSAT CS2-1-3

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	14.6 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER,	1360.4 (BTU/HR),	TOTAL RADIATOR AREA	15.5 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	1450.4 (BTU/HR)
STORCD ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	642.1 (WATT-IN)
		AVERAGE HEAT LOAD	1459.5 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	13.1
HEAT PIPES	4.2
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	9.3
TOTAL	29.3

IERR 11C0001011

STRUCTURES

SKIN THICKNESS	.016 (IN)		
SPINGER NO., THICKNESS, HT.	183.	81910.347 (IN),	.377 (IN)
FRAME NO., THICKNESS, HT.	5.	.108 (IN),	.541 (IN)
GRID BEAM THICKNESS	.146 (IN),	SPACING 4.102 (IN),	HEIGHT 2.051 (IN)
ENCCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	118.6 (LBS)		
SOLAR ARRAY BOOM AND CRIVE WT.	22.1 (LBS)		
ADAPTER WEIGHT	50.6 (LBS)		

V1-458

INATSAT CS2-1-3

*** ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1E15	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
E18	THRUSTER	18	.4	.0	0.0
E34	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-459

INATSAT CS2-1-3

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	7	2.3	.0	0.0
260	BATTERY	2	47.5	.2	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	450.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	95.0
DATA PROCESSING	30.1
COMMUNICATIONS	38.9
BATTERIES	95.0
POWER CONTROL	64.3
SOLAR ARRAY	41.4
HARNES	58.5
STRUCTURE	152.5
SOLAR ARRAY DRIVE	6.9
THERMAL CONTROL	29.3
DRY WEIGHT	1105.1
PROPELLANT	218.1
SATELLITE ADAPTER	50.6

TOTAL LAUNCH WEIGHT 1373.8

VI-460

MULTIPURPOSE P/L (P1-1-1)

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .300000 (DFG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 29089. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.

64.

16.

8.

4.

1250

64.

0.

128.

100.

8.

2.

1.0000

64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 1567.18 WATTS

TOTAL SOLAR ARRAY AREA 337.68 SQ FT

INSTALLED BATTERY CAPACITY 100.00 AMP-HR

BEGINNING OF LIFE POWER 4159.33 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 2465.6 LBS (1118.4 KG)

LAUNCH WEIGHT = 2554.0 LBS (1158.5 KG)

DIMENSIONS

EQUIPMENT BAY 39.6 IN. (1.01 M)

66.1 IN. (1.68 M)

66.1 IN. (1.68 M)

MISSION EQUIPMENT 31.5 IN. (.80 M)

52.5 IN. (1.33 M)

52.5 IN. (1.33 M)

TOTAL SATELLITE 71.2 IN. (1.81 M)

MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

2221.4 IYY = 1531803.3

IZZ = 10719380.9

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 38.6 IN. (.98 M)

0.0 IN. (0.00 M)

0.0 IN. (0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION

450.1 / 450.1 28.5

MISSION LIFETIME

36.0 (MO)

MEAN MISSION DURATION

32.2 (MO)

RELIABILITY

.756

VI-461

MULTIPURPOSE P/L CP1-1-1

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 2 2

WEIGHT 58.40 LBS VOLUME 1.77(FT**3)

RELIABILITY .9946

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1127

EQUIPMENT QUANTITIES 18 6 5 9 2 1 1

WEIGHT 238.79 LBS VOLUME 6.92(FT**3)

DRY WEIGHT 73.51(LBS), EXPENDABLE WEIGHT

RELIABILITY .9561

IERR 11

509 701 1203 603
1 2 1 1
POWER REQUIREMENT .3 WATTS
165.28(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403

EQUIPMENT QUANTITIES 1 1 3 1

WEIGHT 80.51 LBS VOLUME 1.67(FT**3)

RELIABILITY .9637

IERR 2

POWER REQUIREMENT 63.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227

EQUIPMENT QUANTITIES 2 1 2 2 3 1 2

WEIGHT 25.04 LBS VOLUME .35(FT**3)

RELIABILITY .9916

IERR*****

312
2
POWER REQUIREMENT 35.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 430 532 269 650 702

EQUIPMENT QUANTITIES 2 11 2 2 2

WEIGHT 332.24 LBS VOLUME 5.38(FT**3)

HARNESS WEIGHT 122.0(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9241

POWER DISSIPATION 1993.5 WATTS
235.1(LBS)

MISSION EQUIPMENT

WEIGHT 1000.00 LBS VOLUME 39.53(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 1250.0 WATTS

VI-462

MULTIPURPOSE P/L CP1-1-1

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	64.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	6209.3 (BTU/HR),	TOTAL RADIATOR AREA	65.1 (FT**2)
HEAT PIPE	76221.2 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	6299.3 (BTU/HR)
STORED ENERGY	125.0 (BTU)	VARIABLE CONDUCTANCE H.P.	720.6 (WATT-IN)
		AVERAGE HEAT LOAD	4869.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	14.3
HEAT PIPES	4.7
PHASE CHANGE MATERIAL	3.1
RADIATOR (ACTIVE)	111.8
TOTAL	133.9

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.022 (IN)		
STRINGER NO., THICKNESS, HT.	159. ,	3945.825 (IN),	.439 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.126 (IN),	.630 (IN)
GRID BEAM THICKNESS	.196 (IN),	SPACING 5.510 (IN),	HEIGHT 2.755 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	149.7 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	54.2 (LBS)		
ADAPTER WEIGHT	88.4 (LBS)		

✓1-463

MULTIPURPOSE P/L CP1-1-1

* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRONICS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
506	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1127	TANK	1	16.7	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	3.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-464

MULTIPURPOSE P/L CP1-1-1

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
430	DISCHGE REGULATOR	2	40.0	1.0	0.0
532	SHUNT REGULATOR	11	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	73.5
DATA PROCESSING	80.5
COMMUNICATIONS	29.0
BATTERIES	142.6
POWER CONTROL	169.7
SOLAR ARRAY	235.1
HARNESS	122.0
STRUCTURE	196.6
SOLAR ARRAY DRIVE	39.0
THERMAL CONTROL	133.9
DRY WEIGHT	2300.3
PROPELLANT	165.3
SATELLITE ADAPTER	88.4

TOTAL LAUNCH WEIGHT 2554.0

V1-465

IR ASTRO SAT (IRAS) CP2-1-5

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- DUAL SPIN
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 16916.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

64.
256.
13.
8.
18.
64.
1250

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 371.65 WATTS
TOTAL SOLAR ARRAY AREA 195.19 SQ FT
INSTALLED BATTERY CAPACITY 18.00 AMP-HR
BEGINNING OF LIFE POWER 851.31 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1656.1 LBS (751.2 KG) LAUNCH WEIGHT = 1734.4 LBS (786.7 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 74.6 IN.(1.89 M) 120.0 IN.(3.05 M) 120.0 IN.(3.05 M)
MISSION EQUIPMENT 24.9 IN.(.63 M) 41.4 IN.(1.05 M) 41.4 IN.(1.05 M)
TOTAL SATELLITE 99.4 IN.(2.53 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 541.7 IYY = 2670730.6 IZZ = 2670730.6

X-CG Y-CG Z-CG
CENTER OF GRAVITY 60.6 IN.(1.54 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 486./ 486./ 90.0
MISSION LIFETIME 36.0(MO)
MEAN MISSION DURATION 31.2(MO)
RELIABILITY .709

VI-466

IR ASTRO SAT (IRAS) CP2-1-5

* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - DUAL SPIN

EQUIPMENT CODE IDENTIFIER 101 203 303 403 503 603 703 806 1413

EQUIPMENT QUANTITIES 1 1 1 1 2 2 2 2 1

WEIGHT 158.40 LBS

RELIABILITY

IERR

VOLUME

4.14(FT**3)

POWER REQUIREMENT

76.7 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 515 701 1203 603

EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1

WEIGHT 188.04 LBS

DRY WEIGHT

RELIABILITY

IERR

VOLUME

5.87(FT**3)

POWER REQUIREMENT

1.0 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 406

EQUIPMENT QUANTITIES 1 1

WEIGHT 19.93 LBS

RELIABILITY

IERR

VOLUME

.28(FT**3)

POWER REQUIREMENT

8.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603

EQUIPMENT QUANTITIES 1 1 2 1 2 1

WEIGHT 26.62 LBS

RELIABILITY

IERR*****

VOLUME

.33(FT**3)

POWER REQUIREMENT

19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 112 213 303 1202

EQUIPMENT QUANTITIES 10 2 2 1

WEIGHT 66.41 LBS

HARNESS WEIGHT

RELIABILITY

VOLUME

.73(FT**3)

POWER DISSIPATION

357.1 WATTS

96.0(LBS), SOLAR ARRAY WEIGHT

.9729

95.9(LBS)

MISSION EQUIPMENT

WEIGHT 490.00 LBS

RELIABILITY

VOLUME

19.38(FT**3)

POWER REQUIREMENT

190.0 WATTS

.9000

VI-467

IR ASTRO SAT (IRAS) CP2-1-5

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	17.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1648.5 (BTU/HR),	TOTAL RADIATOR AREA	19.1 (FT**2)
HEAT PIPE	22056.4 (WATT-IN),	BATTERY HEATER POWER	113.9 (BTU/HR)
HEAT PIPE LENGTH	6.2 (FT)	TOTAL HEATER POWER	1762.4 (BTU/HR)
STORED ENERGY	106.5 (BTU)	VARIABLE CONDUCTANCE H.P.	1286.2 (WATT-IN)
		AVERAGE HEAT LOAD	1008.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	30.0
HEAT PIPES	6.5
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	11.3
TOTAL	50.5

IERR 1110011011

STRUCTURES				
SKIN THICKNESS	.017 (IN)			
STRINGER NO., THICKNESS, HT.	247.		4034.953 (IN),	.512 (IN)
FRAME NO., THICKNESS, HT.	5.		.147 (IN),	.735 (IN)
GRID BEAM THICKNESS	.145 (IN),	SPACING	4.092 (IN),	HEIGHT 2.046 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	127.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	78.4 (LBS)			

894-1A

IF ASTRO SAT (IRAS) CP2-1-5

* * * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.8	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUJATION DAMPER	1	2.8	.3	0.0
503	GIMBAL ELECTRONCS	2	6.3	.3	31.6
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
703	BIAXIAL DRIVE	2	14.3	.5	28.0
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMO DECOD+DISTR	1	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMFAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-469

IR ASTRO SAT (IRAS) CP2-1-5

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	10	1.4	.0	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	490.0
STABILITY AND CONTROL	142.5
AUXILIARY PROPULSION	86.4
DATA PROCESSING	19.9
COMMUNICATIONS	26.6
BATTERIES	34.4
POWER CONTROL	32.0
CONVERTERS	15.9
SOLAR ARRAY	95.9
HARNESSES	96.0
STRUCTURE	464.2
THERMAL CONTROL	50.5
DRY WEIGHT	1554.4
PROPELLANT	101.7
SATELLITE ADAPTER	78.4

TOTAL LAUNCH WEIGHT 1734.4

V1-470

FRENCH SCIENTIFIC CP2-1-6

* * SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- DUAL SPIN
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 16916.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

64.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 362.26 WATTS
TOTAL SOLAR ARRAY AREA 275.37 SQ FT
INSTALLED BATTERY CAPACITY 18.00 AMP-HR
BEGINNING OF LIFE POWER 839.84 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1812.5 LBS (822.2 KG)
DIMENSIONS LENGTH

LAUNCH WEIGHT = 1898.7 LBS (861.2 KG)
HEIGHT WIDTH

EQUIPMENT BAY 105.2 IN.(2.67 M)
MISSION EQUIPMENT 24.7 IN.(.63 M)

120.0 IN.(3.05 M)
41.1 IN.(1.05 M)

120.0 IN.(3.05 M)
41.1 IN.(1.05 M)

TOTAL SATELLITE 129.9 IN.(3.30 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX =

599.4 IYY = 4482468.8

IZZ = 4482468.8

X-CG

Y-CG

Z-CG

CENTER OF GRAVITY 81.9 IN.(2.08 M)

0.0 IN.(0.00 M)

0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 450./ 450./ 98.7
MISSION LIFETIME 36.0(MO)
MEAN MISSION DURATION 31.1(MO)
RELIABILITY .704

VI-471

FRENCH SCIENTIFIC CP2-1-6

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - DUAL SPIN

EQUIPMENT CODE IDENTIFIER	101	203	303	403	503	603	703	806	1413	
EQUIPMENT QUANTITIES	1	1	2	1	2	2	2	2	1	
WEIGHT	158.70 LBS									
VOLUME					4.15(FT**3)					
POWER REQUIREMENT										76.7 WATTS

RELIABILITY .9124

IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	906	1003	499	203	1124	515	701	1203	603
EQUIPMENT QUANTITIES	6	2	5	9	2	1	1	1	2	1	1
WEIGHT	174.51 LBS										
VOLUME					5.54(FT**3)						
POWER REQUIREMENT											.3 WATTS

EXPENDABLE WEIGHT 99.28(LBS)

RELIABILITY .9570

IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	406				
EQUIPMENT QUANTITIES	1	2				
WEIGHT	30.93 LBS					
VOLUME			.40(FT**3)			
POWER REQUIREMENT						8.5 WATTS

RELIABILITY .9891

IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	203	103	306	401	503	603
EQUIPMENT QUANTITIES	1	1	2	1	3	1
WEIGHT	28.12 LBS					
VOLUME					.35(FT**3)	
POWER REQUIREMENT						19.5 WATTS

RELIABILITY .9770

IERR*****

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	106	213	303	1202		
EQUIPMENT QUANTITIES	12	2	3	1		
WEIGHT	107.96 LBS					
VOLUME					2.23(FT**3)	
POWER DISSIPATION						356.7 WATTS

SOLAR ARRAY WEIGHT 135.4(LBS)

RELIABILITY .9270

MISSION EQUIPMENT

WEIGHT	480.00 LBS					
VOLUME			18.99(FT**3)			
POWER REQUIREMENT						175.0 WATTS

RELIABILITY .9000

VI-472

FRENCH SCIENTIFIC CP2-1-6

* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	11.4 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1060.2 (BTU/HR),	TOTAL RADIATOR AREA	12.7 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	113.9 (BTU/HR)
HEAT PIPE LENGTH	8.1 (FT)	TOTAL HEATER POWER	1174.1 (BTU/HR)
STORED ENERGY	106.5 (BTU)	VARIABLE CONDUCTANCE H.P.	1680.2 (WATT-IN)
		AVERAGE HEAT LOAD	954.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	38.0
HEAT PIPES	8.5
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	7.2
TOTAL	56.4

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	230.	3945.825 (IN),	.550 (IN)
FRAME NO., THICKNESS, HT.	7.	.158 (IN),	.789 (IN)
GRID BEAM THICKNESS	.151 (IN),	SPACING 4.263 (IN),	HEIGHT 2.131 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	146.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	86.1 (LBS)		

VI-473

FRENCH SCIENTIFIC CP2-1-6

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.8	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
503	GIMBAL ELECTRONCS	2	6.3	.3	31.6
603	CONTROL ELECTRONCS	2	7.4	.4	3.5
703	BIAXIAL DRIVE	2	14.3	.5	28.0
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMPD DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-474

FRENCH SCIENTIFIC CP2-1-6

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
106	SHUNT REGULATOR	12	4.3	.1	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	3	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	480.0
STABILITY AND CONTROL	142.8
AUXILIARY PROPULSION	75.2
DATA PROCESSING	30.9
COMMUNICATIONS	28.1
BATTERIES	34.4
POWER CONTROL	73.5
CONVERTERS	15.9
SOLAR ARRAY	135.4
HARNESS	114.6
STRUCTURE	525.7
THERMAL CONTROL	56.4
DRY WEIGHT	1713.3
PROPELLANT	99.3
SATELLITE ADAPTER	86.1

1713.8

TOTAL LAUNCH WEIGHT 1898.7

VI-475

CANADIAN SCIENTIFIC CP2-1-8

* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = .750000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 14065.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 79.25 WATTS
TOTAL SOLAR ARRAY AREA 33.01 SQ FT
INSTALLED BATTERY CAPACITY 8.00 AMP-HR
BEGINNING OF LIFE POWER 106.76 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 551.0 LBS (249.9 KG) LAUNCH WEIGHT = 571.4 LBS (259.2 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH	
EQUIPMENT BAY	32.1 IN.(.82 M)	53.6 IN.(1.36 M)	53.6 IN.(1.36 M)		
MISSION EQUIPMENT	15.8 IN.(.40 M)	26.3 IN.(.67 M)	26.3 IN.(.67 M)		
TOTAL SATELLITE	47.9 IN.(1.22 M)				

MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 48.3 IYY = 215233.8 IZZ = 215233.8

CENTER OF GRAVITY		X-CG	Y-CG	Z-CG
23.9 IN.(.61 M)	0.0 IN.(0.00 M)	0.0 IN.(0.00 M)	0.0 IN.(0.00 M)	

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0
MISSION LIFETIME 36.0(MO)
MEAN MISSION DURATION 31.9(MO)
RELIABILITY .715

VI-476

CANADIAN SCIENTIFIC CP2-1-8

*** SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL

EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413
EQUIPMENT QUANTITIES	1	1	1	1	2	1
WEIGHT	36.10 LBS					
RELIABILITY		.9432			1.43(FT**3)	
IERR	0					

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	834	834	907	1003	499	203	1118
EQUIPMENT QUANTITIES	6	2	5	9	1	1	1
WEIGHT	143.20 LBS						
DRY WEIGHT	58.85(LBS)				4.26(FT**3)		
RELIABILITY		.9020					
IERR	1						

509	701	1203	603
1	2	1	1
POWER REQUIREMENT 1.0 WATTS			
84.34(LBS)			

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403
EQUIPMENT QUANTITIES	1	1
WEIGHT	21.18 LBS	
RELIABILITY		.9799
IERR	1	

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603
EQUIPMENT QUANTITIES	1	1	2	1	2	1
WEIGHT	24.62 LBS					
RELIABILITY		.9791			.92(FT**3)	
IERR	*****					

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	102	204	303	1202
EQUIPMENT QUANTITIES	8	2	2	1
WEIGHT	75.70 LBS			
HARNESS WEIGHT		28.4(LBS)		
RELIABILITY		.9734		

POWER DISSIPATION 7.4 WATTS
16.2(LBS)

MISSION EQUIPMENT

WEIGHT	125.00 LBS		
RELIABILITY		.9000	
			4.95(FT**3)

POWER REQUIREMENT 25.0 WATTS

VI-477

CANADIAN SCIENTIFIC CP2-1-8

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	1.9 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	157.8 (BTU/HR),	TOTAL RADIATOR AREA	3.1 (FT**2)
HEAT PIPE	2389.5 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	3.0 (FT)	TOTAL HEATER POWER	272.8 (BTU/HR)
STORED ENERGY	64.1 (BTU)	VARIABLE CONDUCTANCE H.P.	619.7 (WATT-IN)
		AVERAGE HEAT LOAD	226.8 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	9.6
HEAT PIPES	3.1
PHASE CHANGE MATERIAL	1.6
RADIATOR (PASSIVE)	1.2

TOTAL	15.6

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.011 (IN)		
STRINGER NO., THICKNESS, HT.	204. ,	81910.347 (IN),	.277 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.079 (IN),	.397 (IN)
GRID BEAM THICKNESS	.096 (IN),	SPACING 2.703 (IN),	HEIGHT 1.351 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	83.0 (LBS)		
SOLAR ARRAY BOOF AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	20.4 (LBS)		

V1-478

CANADIAN SCIENTIFIC CP2-1-8

*** ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	1	10.2	1.3	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

647-11

CANADIAN SCIENTIFIC CP2-1-8

* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	8	5.0	.1	0.0
204	BATTERY	2	8.6	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	125.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	58.9
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	17.2
POWER CONTROL	58.5
CONVERTERS	15.9
SOLAR ARRAY	16.2
HARNESS	28.4
STRUCTURE	65.0
THERMAL CONTROL	15.6
DRY WEIGHT	466.7
PROPELLANT	84.3
SATELLITE ADAPTER	20.4

TOTAL LAUNCH WEIGHT 571.4

087-11480

ASTRO-A CP2-1-14

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL
POINTING ACCURACY = 1.600000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT
TOTAL IMPULSE = 4415.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
COMPUTER OPERATIONS RATE = 0.(IPS)

CDFI TABLE

NUMBER OF COMMANDS
NUMBER OF MAIN FRAME WORDS
MAIN FRAME SAMPLE RATE
MAIN FRAME WORD LENGTH
NUMBER OF SUBFRAMES
SUBFRAME RATE
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.
256.
13.
8.
18.
.1250
64.

MISSION EQUIPMENT DATA

0.
0.
0.
0.
0.
0.0000
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY
POWER REQUIREMENT 65.51 WATTS
TOTAL SOLAR ARRAY AREA 34.49 SQ FT
INSTALLED BATTERY CAPACITY 6.00 AMP-HR
BEGINNING OF LIFE POWER 150.43 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER
WET SATELLITE WEIGHT = 450.1 LBS (204.1 KG) LAUNCH WEIGHT = 466.8 LBS (211.7 KG)
DIMENSIONS LENGTH HEIGHT WIDTH
EQUIPMENT BAY 30.9 IN.(.78 M) 51.4 IN.(1.31 M) 51.4 IN.(1.31 M)
MISSION EQUIPMENT 14.4 IN.(.37 M) 24.0 IN.(.61 M) 24.0 IN.(.61 M)
TOTAL SATELLITE 45.3 IN.(1.15 M)
MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 35.8 IYY = 162105.7 IZZ = 162105.7
X-CG Y-CG Z-CG
CENTER OF GRAVITY 22.8 IN.(.58 M) 0.0 IN.(0.00 M) 0.0 IN.(0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM
APGEE/PERIGEE/INCLINATION 270./ 270./ 30.0
MISSION LIFETIME 12.0(MO)
MEAN MISSION DURATION 10.7(MO)
RELIABILITY .726

11-481

ASTRO-A CP2-1-14

* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 29.28 LBS VOLUME 1.18(FT**3)
RELIABILITY .9591
IERR 0

POWER REQUIREMENT 9.4 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116
EQUIPMENT QUANTITIES 6 2 4 9 1 1 1
WEIGHT 79.57 LBS VOLUME 3.80(FT**3)
DRY WEIGHT 53.03(LBS), EXPENDABLE WEIGHT
RELIABILITY .9079
IERR 11

506 701 1203 603
POWER REQUIREMENT 1.0 WATTS
26.54(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403
EQUIPMENT QUANTITIES 1 1
WEIGHT 21.18 LBS VOLUME .39(FT**3)
RELIABILITY .9933
IERR

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603
EQUIPMENT QUANTITIES 1 1 1 1 1 1
WEIGHT 23.02 LBS VOLUME .29(FT**3)
RELIABILITY .9574
IERR*****

POWER REQUIREMENT 19.9 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 102 202 303 1202
EQUIPMENT QUANTITIES 10 2 2 1
WEIGHT 87.47 LBS VOLUME 1.92(FT**3)
HARNESS WEIGHT 26.2(LBS), SOLAR ARRAY WEIGHT
RELIABILITY .9742

POWER DISSIPATION 74.4 WATTS
17.0(LBS)

MISSION EQUIPMENT

WEIGHT 95.00 LBS VOLUME 3.76(FT**3)
RELIABILITY .9000

POWER REQUIREMENT 24.0 WATTS

287-1A

ASTRO-A CP2-1-14

* * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	4.0 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	353.1 (BTU/HR),	TOTAL RADIATOR AREA	5.3 (FT**2)
HEAT PIPE	2223.5 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	2.8 (FT)	TOTAL HEATER POWER	475.3 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	585.5 (WATT-IN)
		AVERAGE HEAT LOAD	223.4 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		9.1
HEAT PIPES		3.0
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		2.5
TOTAL		16.4

IERR 1100010011

STRUCTURES			
SKIN THICKNESS	.010 (IN)		
STRINGER NO., THICKNESS, HT.	211.	3487.671 (IN),	.257 (IN)
FRAME NO., THICKNESS, HT.	5.	.074 (IN),	.368 (IN)
GRID BEAM THICKNESS	.086 (IN),	SPACING 2.424 (IN),	HEIGHT 1.212 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	66.5 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	16.7 (LBS)		

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ASTRO-A CP2-1-14

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUITATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PKSSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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ASTRO-A CP2-1-14

* * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	10	5.0	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	95.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	23.0
BATTERIES	19.0
POWER CONTROL	68.5
CONVERTERS	15.9
SOLAR ARRAY	17.0
HARNESS	26.2
STRUCTURE	55.0
THERMAL CONTROL	16.4
DRY WEIGHT	423.5
PROPELLANT	26.5
SATELLITE ADAPTER	16.7

TOTAL LAUNCH WEIGHT 466.8

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JAPAN SCI CP2-1-16

*** SYSTEM DESCRIPTION -- DESIGN NUMBER 1 ***

STABILIZATION AND CONTROL
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL
 POINTING ACCURACY = .300000 (DEG.)
 AUXILIARY PROPULSION
 CONFIGURATION -- MONOPROPELLANT
 TOTAL IMPULSE = 4924. (LB-SEC)
 DATA PROCESSING AND INSTRUMENTATION
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS
 PRIMARY DOWNLINK DATA RATE = 256.000 (KBPS)
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)
 ELECTRICAL POWER
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY
 POWER REQUIREMENT 307.08 WATTS
 TOTAL SOLAR ARRAY AREA 71.59 SQ FT
 INSTALLED BATTERY CAPACITY 20.00 AMP-HR
 BEGINNING OF LIFE POWER 681.80 WATTS

VEHICLE SIZING
 CONFIGURATION -- CYLINDER
 NET SATELLITE WEIGHT = 815.7 LBS (370.0 KG) LAUNCH WEIGHT = 847.3 LBS (384.3 KG)
 DIMENSIONS
 EQUIPMENT BAY 28.8 IN. (.73 M) 48.0 IN. (1.22 M) 48.0 IN. (1.22 M)
 MISSION EQUIPMENT 23.2 IN. (.59 M) 38.7 IN. (.98 M) 38.7 IN. (.98 M)
 TOTAL SATELLITE 52.0 IN. (1.32 M)
 MOMENTS OF INERTIA (SLUGS*FT**2) IXX = 107.6 IYY = 289634.4 IZZ = 580749.1
 CENTER OF GRAVITY 29.8 IN. (.76 M) 0.0 IN. (0.00 M) 0.0 IN. (0.00 M)

RELIABILITY
 CONFIGURATION -- SINGLE SYSTEM
 APOGEE/PERIGEE/INCLINATION 270.0 / 270.0 / 30.0
 MISSION LIFETIME 36.0 (MO)
 MEAN MISSION DURATION 31.3 (MO)
 RELIABILITY .712

987-1A

JAPAN SCI CP2-1-16

* * SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1305

EQUIPMENT QUANTITIES 2 2 1 1

WEIGHT 37.80 LBS VOLUME 1.19(FT**3)

RELIABILITY .9550

IERR 0

POWER REQUIREMENT 103.6 WATTS

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1115

EQUIPMENT QUANTITIES 12 4 5 9 1 1 1

WEIGHT 69.88 LBS VOLUME 2.96(FT**3)

DRY WEIGHT 40.66(LBS), EXPENDABLE WEIGHT

RELIABILITY .9450

IERR 10

506 701 1203 603
1 2 1 1
POWER REQUIREMENT
29.22(LBS)

.3 WATTS

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME .39(FT**3)

RELIABILITY .9799

IERR

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 227 106 303 401 503 603

EQUIPMENT QUANTITIES 2 2 2 1 2 1

WEIGHT 19.92 LBS VOLUME .26(FT**3)

RELIABILITY .9805

IERR*****

POWER REQUIREMENT 18.4 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 215 603 702

EQUIPMENT QUANTITIES 2 8 2 2 1

WEIGHT 80.12 LBS VOLUME 1.35(FT**3)

HARNESS WEIGHT 31.4(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .9172

POWER DISSIPATION 447.8 WATTS
49.9(LBS)

MISSION EQUIPMENT

WEIGHT 400.00 LBS VOLUME 15.83(FT**3)

RELIABILITY .9000

POWER REQUIREMENT 100.0 WATTS

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JAPAN SCI CP2-1-16

* * * SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL
RADIATOR AREA

10.5 (FT**2),

HEATER POWER

996.1 (BTU/HR),

HEAT PIPE

5079.9 (WATT-IN),

HEAT PIPE LENGTH

3.3 (FT)

STORED ENERGY

102.7 (BTU)

BATTERY RADIATOR AREA

11.2 (FT**2)

TOTAL RADIATOR AREA

21.7 (FT**2)

BATTERY HEATER POWER

70.7 (BTU/HR)

TOTAL HEATER POWER

1066.8 (BTU/HR)

VARIABLE CONDUCTANCE H.P.

526.7 (WATT-IN)

AVERAGE HEAT LOAD

793.6 (BTU/HR)

THERMAL CONTROL WEIGHT

UNIT WEIGHT (LBS)

INSULATION

5.4

HEAT PIPES

3.4

PHASE CHANGE MATERIAL

2.6

RADIATOR (PASSIVE)

6.6

TOTAL

22.1

IERR

1111011011

STRUCTURES

SKIN THICKNESS .013 (IN)

STRINGER NO., THICKNESS, HT.

178.

FRAME NO., THICKNESS, HT.

5.

GRID BEAM THICKNESS

.114 (IN)

ENCLOSURE THICKNESS- FORWARD

.030 (IN)

EQUIPMENT BAY STRUCTURE WT.

46.7 (LBS)

SOLAR ARRAY BOOM AND CRUISE WT.

23.5 (LBS)

ADAPTER WEIGHT

31.6 (LBS)

3487.671 (IN),

.082 (IN),

3.209 (IN),

0.000 (IN),

SPACING

0.000 (IN),

HEIGHT

1.605 (IN)

AFT

.030 (IN)

884-1A

JAPAN SCI CP2-1-16 .

* * ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 * * * *

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1305	REACTION WHEEL	1	5.0	.1	25.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
634	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1115	TANK	1	3.5	.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
303	TRANSMITTER	2	2.2	.0	10.2
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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JAPAN SCI CP2-1-16

* * * ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	8	2.3	.0	0.0
215	BATTERY	2	13.9	.1	0.0
603	BATTERY CHARGER	2	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	400.0
STABILITY AND CONTROL	37.8
AUXILIARY PROPULSION	40.7
DATA PROCESSING	21.2
COMMUNICATIONS	19.9
BATTERIES	27.7
POWER CONTROL	52.4
SOLAR ARRAY	49.9
HAPNESS	31.4
STRUCTURE	75.2
SOLAR ARRAY DRIVE	8.3
THERMAL CONTROL	22.1
DPY WEIGHT	786.5
PROPELLANT	29.2
SATELLITE ADAPTER	31.6

TOTAL LAUNCH WEIGHT 847.3

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Appendix VII

Spacecraft Cost Model (SCM)

**** SATELLITE SYSTEMS COST MODEL ****
NDI-1-1 LNDST F/O

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 400. NUMBER OF QUAL UNITS = 0
BOL POWER = 1321. ARRAY AREA = 107.3 SQ FT BATT CAP = 34. AMP-HR

VII-1

SPACECRAFT COST MODEL

NO1-1-1 LNDST F/O

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.4	1.3	6.7	7.5	5.0	12.5
THERMAL CONTROL	.6	.2	.8	.9	.8	1.6
ELECTRICAL POWER	3.2	.9	4.1	5.0	6.8	11.8
COMMUNICATIONS	.9	.4	1.3	1.8	2.3	4.1
DATA HANDLING	8.4	1.1	9.4	14.2	4.7	18.9
STABILITY AND CONTROL	4.2	1.6	5.8	7.8	6.1	14.0
AUXILIARY PROPULSION	1.3	.7	2.0	2.8	3.3	6.1
SPACECRAFT MISSION EQUIPMENT	24.0	6.0	30.0 54.6	40.0	8.9	68.9 146.8
SATELLITE QUALIFICATION UNIT(S)			84.6 0.0			215.6
GSE (AGE)			2.1			
LAUNCH SITE SUPPORT						2.7
CONTRACTOR FEE			2.2			5.0
TOTAL SATELLITE			88.9			223.4
AVERAGE UNIT COST (6 SATELLITES)						37.2
TOTAL SATELLITE DDT+E AND RECURRING COST						312.3

1/1

NO1-1-1 LNDST F/O

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	19691.	23114.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	284348.	270636.
2203	CONTROL ELECTRNCS.	2	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	73834.	66265.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40718.	37973.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1138585.	139061.	243439.	443547.
345	TAPE RECORDER	2	16.8	25.0	1.00	499633.	583549.	260694.	194637.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3278662.	47819.	46506.	756569.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	70886.	39543.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	72985.	40928.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

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NO1-1-1 LNDST F/O

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	26.8	0.0	.10	36087.	24319.	85283.	61151.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	74.7	1.00	614420.	124360.	241919.	141781.
WIRING HARNESS	71.6	1.00	307038.	180625.	186086.	70851.
THERMAL CONTROL	31.3	1.00	369455.	113210.	88379.	85254.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	53.2	1.00	731772.	414573.	268825.	168861.
STRUCTURE	118.2	1.00	2496558.	627873.	305352.	576095.
POWER CONTROL UNITS	63.6	1.00	934531.	291011.	283054.	215648.
SOLAR ARRAY DRIVE	12.4	1.00	550688.	249051.	242241.	127074.
SATELLITE ADAPTER	65.6	1.00	134358.	60028.	34812.	31004.
PROPELLANT WEIGHT	54.9					
MISSION EQUIP WEIGHT	1060.0					

TOTAL SATELLITE WEIGHT 1784.2

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**** SATELLITE SYSTEMS COST MODEL ****
Nø1-1-2 ESS.

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 486. NUMBER OF QUAL UNITS = 0
BOL POWER = 1153. ARRAY AREA = 93.6 SQ FT BATT CAP = 30. AMP-HR

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SPACECRAFT COST MODEL

NO1-1-2 ESS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.0	4.7	5.1	4.1	9.2
THERMAL CONTROL	.5	.1	.7	.8	.7	1.4
ELECTRICAL POWER	2.8	.7	3.5	4.4	5.8	10.2
COMMUNICATIONS	.9	.4	1.3	1.8	2.3	4.1
DATA HANDLING	5.3	1.1	6.3	9.2	4.7	13.8
STABILITY AND CONTROL	4.2	1.6	5.8	7.8	6.1	14.0
AUXILIARY PROPULSION	.9	.5	1.5	2.3	2.6	4.9
SPACECRAFT MISSION EQUIPMENT	18.4	5.4	23.8 29.9	31.3	26.4	57.7 68.0
SATELLITE QUALIFICATION UNIT(S)			53.7 0.0			125.7
GSE (AGE)			1.7			2.5
LAUNCH SITE SUPPORT						4.2
CONTRACTOR FEE			1.8			
TOTAL SATELLITE			57.2			132.4
AVERAGE UNIT COST (6 SATELLITES)						22.1
TOTAL SATELLITE DDT+E AND RECURRING COST						189.6

NO1-1-2 ESS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	19691.	23114.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	284348.	270636.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	73834.	66265.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40718.	37973.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	642664.	139061.	243439.	250356.
345	TAPE RECORDER	2	16.8	25.0	1.00	499633.	583549.	260694.	194637.
403	COMPD DECOD+DISTR	1	2.3	7.5	1.00	1960200.	47819.	46506.	452327.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	70886.	39543.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	72985.	40928.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

NO1-1-2 ESS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDIE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	23.8	0.0	.10	32587.	22323.	78283.	55220.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDIE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	65.2	1.00	558391.	109642.	213289.	128852.
WIRING HARNESS	41.3	1.00	192554.	113276.	116701.	44433.
THERMAL CONTROL	27.1	1.00	321108.	102673.	81235.	74097.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	34.3	1.00	535045.	296332.	192153.	123465.
STRUCTURE	90.1	1.00	1612765.	498498.	242433.	372154.
POWER CONTROL UNITS	61.3	1.00	863049.	284808.	277020.	199153.
SOLAR ARRAY DRIVE	10.8	1.00	501449.	221457.	215402.	115712.
SATELLITE ADAPTER	35.8	1.00	53531.	33709.	24426.	12353.

PROPELLANT WEIGHT 27.4

MISSION EQUIP WEIGHT 400.0

TOTAL SATELLITE WEIGHT 400.0

8-11-8

**** SATELLITE SYSTEMS COST MODEL ****

N01-1-3 steps

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0

BOL POWER = 1148. ARRAY AREA = 90.1 SQ FT BATT CAP = 100. AMP-HR

6-11A

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SPACECRAFT COST MODEL

NO1-1-3 SEOS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.4	1.4	6.9	5.2	3.7	8.9
THERMAL CONTROL	1.3	.3	1.6	1.2	.9	2.1
ELECTRICAL POWER	3.1	.9	4.0	3.9	5.3	9.2
COMMUNICATIONS	2.1	.6	2.7	2.4	2.6	5.1
DATA HANDLING	8.5	1.1	9.5	10.8	4.0	14.8
STABILITY AND CONTROL	4.2	1.6	5.8	5.7	4.3	10.0
AUXILIARY PROPULSION	1.2	.7	1.9	1.9	2.2	4.1
SPACECRAFT MISSION EQUIPMENT	25.8	6.6	32.3 51.9	31.1	23.1	54.2 93.0
SATELLITE QUALIFICATION UNIT(S)			84.2 0.0			147.2
GSE (AGE)			2.2			
LAUNCH SITE SUPPORT						1.9
CONTRACTOR FEE			2.4			3.9
TOTAL SATELLITE			88.9			153.1
AVERAGE UNIT COST (4 SATELLITES)						38.3
TOTAL SATELLITE DDT+E AND RECURRING COST						242.0

VII-10

NO1-1-3 SEOS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	20942.	24011.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	75208.	70390.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1155439.	139061.	258914.	503068.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3322281.	47819.	49463.	796384.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

11-11

NO1-1-3 SEOS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	175964.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	62.8	1.00	543592.	105400.	219104.	130329.
WIRING HARNESS	77.7	1.00	329081.	193593.	212124.	78884.
THERMAL CONTROL	76.3	1.00	743801.	207136.	158307.	178297.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	50.5	1.00	706105.	398379.	274745.	169260.
STRUCTURE	149.1	1.00	2567683.	764897.	395638.	615500.
POWER CONTROL UNITS	73.3	1.00	860858.	316208.	327114.	206356.
SOLAR ARRAY DRIVE	10.4	1.00	488781.	214466.	221862.	117166.
SATELLITE ADAPTER	67.3	1.00	137312.	63260.	37583.	32915.

PROPELLANT WEIGHT 108.7

MISSION EQUIP WEIGHT 910.0

TOTAL SATELLITE WEIGHT 1884.5

VII-12

**** SATELLITE SYSTEMS COST MODEL ****
NØ 1-1-4 GRAVSAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 160. NUMBER OF QUAL UNITS = 0
VOL POWER = 352. ARRAY AREA = 59.5 SQ FT BATT CAP = 8. AMP-HR

V11-13

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SPACECRAFT COST MODEL

NO1-1-4 GRAVSAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	2.2	6.1	0.0	1.4	1.4
THERMAL CONTROL	.8	.2	.9	0.0	.2	.2
ELECTRICAL POWER	2.7	1.1	3.8	.0	1.3	1.3
COMMUNICATIONS	.6	.2	.8	.0	.3	.3
DATA HANDLING	4.2	.4	4.7	0.0	.6	.6
STABILITY AND CONTROL	5.7	1.4	7.1	.0	1.4	1.4
AUXILIARY PROPULSION	3.3	1.9	5.2	.1	1.7	1.8
SPACECRAFT	21.2	7.3	28.5	.2	6.9	7.1
MISSION EQUIPMENT			20.1			9.4
SATELLITE			48.6			6.5
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.9			
LAUNCH SITE SUPPORT						.4
CONTRACTOR FEE			2.1			.5
TOTAL SATELLITE			52.6			7.5
AVERAGE UNIT COST (1 SATELLITES)						17.5
TOTAL SATELLITE DDT+E AND RECURRING COST						70.1

NO1-1-4 GRAVSAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	1	10.0	4.0	1.00	1349183.	500699.	358223.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1718	RATE INTEGR GYRO	1	9.6	32.0	1.00	800266.	172894.	220785.	0.
1803	EARTH SENSOR	1	14.6	19.0	1.00	1118880.	282384.	356862.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	567538.	139061.	177581.	0.
406	COMMD DECOD+DISTR	1	11.0	5.5	1.00	1929232.	184082.	235073.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-15

NO1-1-4 GRAVSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39719.	22394.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	29.2	1.00	406638.	52111.	133106.	0.
WIRING HARNESS	84.8	1.00	354410.	208493.	282037.	0.
THERMAL CONTROL	31.3	1.00	455973.	113210.	116046.	0.
POWER CONVERTERS	10.0	1.00	410936.	256004.	163477.	0.
PROPULSION FEED SYS	241.9	1.00	1915834.	1320566.	1124364.	0.
STRUCTURE	331.3	1.00	2167327.	1507771.	962816.	0.
POWER CONTROL UNITS	43.7	1.00	431115.	233652.	298406.	0.
SATELLITE ADAPTER	63.7	1.00	131043.	57127.	44930.	0.

PROPELLANT WEIGHT 537.9

MISSION EQUIP WEIGHT 225.0

TOTAL SATELLITE WEIGHT 1694.1

91-11A

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**** SATELLITE SYSTEMS COST MODEL ****
N01-1-5 MAGSAT-B

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 297. NUMBER OF QUAL UNITS = 0
BOL POWER = 185. ARRAY AREA = 60.6 SQ FT BATT CAP = 6. AMP-HR

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11-17

115.

SPACECRAFT COST MODEL

NOI-1-5 MAGSAT-B

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.5	.7	2.2	0.0	.5	.5
THERMAL CONTROL	.4	.1	.5	0.0	.1	.1
ELECTRICAL POWER	2.4	.9	3.4	.0	1.1	1.1
COMMUNICATIONS	.6	.2	.8	0.0	.3	.3
DATA HANDLING	2.0	.3	2.2	0.0	.3	.3
STABILITY AND CONTROL	3.0	.8	3.8	0.0	.7	.7
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	11.2	3.7	14.8 8.8	.2	3.5	3.7 3.6
SATELLITE QUALIFICATION UNIT(S)			23.7 0.0			7.3
GSE (AGE)			1.2			
LAUNCH SITE SUPPORT						.3
CONTRACTOR FEE			1.1			.3
TOTAL SATELLITE			26.0			7.9
AVERAGE UNIT COST (1 SATELLITES)						7.9
TOTAL SATELLITE DDT+E AND RECURRING COST						13.8

NO1-1-5 MAGSAT-B

*** ASSEMBLY DESCRIPTIONS ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	120258.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	249220.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	920290.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

61-11A

11/1

NO1-1-5 MAGSAT-B

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	29.8	1.00	411885.	53102.	135637.	0.
WIRING HARNESS	21.1	1.00	108948.	64092.	86700.	0.
THERMAL CONTROL	19.5	1.00	206830.	82139.	87985.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.	0.
STRUCTURE	90.5	1.00	877931.	500378.	319526.	0.
POWER CONTROL UNITS	31.1	1.00	295911.	191493.	244563.	0.
SATELLITE ADAPTER	17.8	1.00	14779.	16432.	21311.	0.

PROPELLANT WEIGHT 36.4

MISSION EQUIP WEIGHT 66.0

TOTAL SATELLITE WEIGHT 450.9

VI-20

**** SATELLITE SYSTEMS COST MODEL ****
NO 1-1-6 S.M.E.R.S

UBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1068. ARRAY AREA = 83.9 SQ FT BATT CAP = 100. AMP-HR

VII-21

SPACECRAFT COST MODEL

NO1-1-6 SMIAS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.9	1.7	7.6	0.0	1.3	1.3
THERMAL CONTROL	1.5	.2	1.6	0.0	.2	.2
ELECTRICAL POWER	3.1	1.0	4.1	.3	1.7	2.0
COMMUNICATIONS	2.1	.7	2.7	.3	.9	1.2
DATA HANDLING	8.0	.3	8.2	.8	.5	1.4
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	1.8	1.0	2.8	.3	1.0	1.3
SPACECRAFT	26.8	6.7	33.5	3.5	7.4	10.9
MISSION EQUIPMENT			55.4			31.0
SATELLITE			88.9			41.9
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.3			
LAUNCH SITE SUPPORT			2.5			.5
CONTRACTOR FEE						.8
TOTAL SATELLITE			93.7			43.2
AVERAGE UNIT COST (1 SATELLITES)						43.2
TOTAL SATELLITE DDT+E AND RECURRING COST						136.9

VI-22

NO1-1-6 SMIAS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1216794.	139061.	319646.	486214.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3480535.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	143749.	62973.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DTPLEXFR	1	1.1	1.0	1.00	57409.	15451.	21942.	0.

VII-23

NO1-1-6 SMIAS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	72.3	0.0	.10	86935.	49758.	183967.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	58.4	1.00	517224.	99011.	252902.	0.
WIRING HARNESS	92.9	1.00	382916.	225263.	304722.	0.
THERMAL CONTROL	35.6	1.00	865004.	123534.	125122.	0.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	92.6	1.00	1025585.	633485.	539365.	0.
STRUCTURE	196.9	1.00	2852239.	968849.	618677.	0.
POWER CONTROL UNITS	84.4	1.00	825239.	343398.	438567.	0.
SOLAR ARRAY DRIVE	9.7	1.00	466226.	202132.	258151.	0.
SATELLITE ADAPTER	80.5	1.00	159891.	73922.	51524.	0.

PROPELLANT WEIGHT 298.3

MISSION EQUIP WEIGHT 1000.0

TOTAL SATELLITE WEIGHT 2225.2

711-24

**** SATELLITE SYSTEMS COST MODEL ****
NØ 1-1-7 HCM 4-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1046. ARRAY AREA = 82.2 SQ FT BATT CAP = 100. AMP-HR

V11-25

SPACECRAFT COST MODEL

NO1-1-7 HCMM-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.9	1.7	7.7	5.7	4.3	10.0
THERMAL CONTROL	1.6	.2	1.8	1.5	.6	2.1
ELECTRICAL POWER	3.1	1.0	4.1	3.9	5.7	9.6
COMMUNICATIONS	2.1	.7	2.7	2.6	2.9	5.4
DATA HANDLING	9.0	1.1	10.1	11.5	4.0	15.5
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.9	1.1	2.9	2.8	3.5	6.3
SPACECRAFT MISSION EQUIPMENT	27.8	7.3	35.2 55.4	33.8	25.4	59.2 100.5
SATELLITE QUALIFICATION UNIT(S)			90.6			159.7
GSE (AGE)			0.0 2.3			
LAUNCH SITE SUPPORT			2.6			2.0
CONTRACTOR FEE						4.3
TOTAL SATELLITE			95.6			166.1
AVERAGE UNIT COST (4 SATELLITES)						41.5
TOTAL SATELLITE DDT+E AND RECURRING COST						261.6

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NO1-1-7 HCMM-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1248062.	139061.	258914.	543396.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3560875.	47819.	49463.	853578.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	58281.	37421.
403	COMMD SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
503	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

V11-27

NO1-1-7 HCMM-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	175964.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	57.2	1.00	509866.	97126.	200951.	122220
WIRING HARNESS	103.3	1.00	418970.	246473.	270066.	100431
THERMAL CONTROL	35.5	1.00	936473.	123299.	101183.	224482
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	456247.	255279
STRUCTURE	102.0	1.00	2872260.	990138.	512143.	688510
POWER CONTROL UNITS	84.4	1.00	815251.	343398.	355241.	195424
SOLAR ARRAY DRIVE	9.5	1.00	459687.	198584.	205433.	110192
SATELLITE ADAPTER	81.6	1.00	161746.	74741.	2067.	38772

PROPELLANT WEIGHT 271.2

MISSION EQUIP WEIGHT 1000.0

TOTAL SATELLITE WEIGHT 2251.6

VII-2.8

**** SATELLITE SYSTEMS COST MODEL ****
N01-1-8 STEREO SAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 312. NUMBER OF QUAL UNITS = 0
BOL POWER = 840. ARRAY AREA = 142.0 SQ FT BATT CAP = 14. AMP-HR

✓11-29

SPACECRAFT COST MODEL

NO1-1-8 STEREOSAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.1	2.4	4.5	1.5	4.0	5.5
THERMAL CONTROL	.4	.2	.7	.3	.6	.9
ELECTRICAL POWER	2.9	.8	3.6	2.2	3.3	5.5
COMMUNICATIONS	.9	.4	1.3	1.0	1.3	2.3
DATA HANDLING	2.9	.3	3.2	2.5	1.4	3.9
STABILITY AND CONTROL	4.2	1.6	5.8	4.4	3.4	7.8
AUXILIARY PROPULSION	1.0	.5	1.5	1.2	1.4	2.7
SPACECRAFT	14.4	6.1	20.5	13.1	5.4	28.5
MISSION EQUIPMENT			12.4			13.6
SATELLITE			32.9			42.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.4			
LAUNCH SITE SUPPORT			1.5			1.2
CONTRACTOR FEE						2.1
TOTAL SATELLITE			35.9			5.3
AVERAGE UNIT COST (3 SATELLITES)						15.1
TOTAL SATELLITE DDT+E AND RECURRING COST						81.2

VII-30

NO1-1-8 STEREOSAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1305	REACTION WHEEL	1	5.0	25.0	1.00	98701.	39694.	21447.	23153.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	32645.	28313.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	315942.	275122.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	429049.	533024.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	75994.	72844.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41909.	41743.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	407362.	139061.	270487.	188002.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1300811.	47819.	51673.	305145.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	13732.	25509.
227	ANTENNA	2	.8	0.0	1.00	55273.	873.	13732.	5509.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	779.	78763.	846.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	590.	81094.	8488.
401	RECEIVER	1	3.9	6.3	1.00	77256.	775.	33825.	123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	796.	35236.	301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	451.	18568.	467.

12-31

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NO1-1-8 STEREOSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
212	BATTERY	2	15.7	0.0	.10	17510.	16570.	59808.	32618.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	69.8	1.00	747562.	116787.	252430.	175364.
WIRING HARNESS	43.2	1.00	200040.	117680.	134708.	46925.
THERMAL CONTROL	54.4	1.00	264090.	164680.	135687.	61950.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	35.2	1.00	545523.	302262.	217775.	127969.
STRUCTURE	376.1	1.00	1167275.	1679403.	907488.	273820.
POWER CONTROL UNITS	70.1	1.00	717082.	308058.	332927.	168214.
SATELLITE ADAPTER	50.5	1.00	71714.	32598.	22161.	16823.
PROPELLANT WEIGHT	15.9					
MISSION EQUIP WEIGHT	110.0					

TOTAL SATELLITE WEIGHT 948.1

VII-32

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**** SATELLITE SYSTEMS COST MODEL ****
NP2-1-1 SEASAT B

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 380. NUMBER OF QUAL UNITS = 0
BOL POWER = 3448. ARRAY AREA = 280.0 SQ FT BATT CAP = 100. AMP-...

VII-33

SPACECRAFT COST MODEL

NO2-1-1 SEASAT B

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.0	9.7	0.0	1.9	1.9
THERMAL CONTROL	.9	.4	1.3	0.0	.4	.4
ELECTRICAL POWER	5.8	1.5	7.3	.3	2.8	3.1
COMMUNICATIONS	.9	.4	1.3	.2	.5	.7
DATA HANDLING	10.9	1.1	11.9	1.7	1.2	2.9
STABILITY AND CONTROL	4.2	1.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.3	.7	2.0	.2	.7	.9
SPACECRAFT MISSION EQUIPMENT	31.6	7.7	39.3 68.0	3.2	8.7	12.0 39.6
SATELLITE QUALIFICATION UNIT(S)			107.2 0.0			51.6
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT						.5
CONTRACTOR FEE			2.0			.9
TOTAL SATELLITE			112.7			53.0
AVERAGE UNIT COST (1 SATELLITES)						53.0
TOTAL SATELLITE DDT+E AND RECURRING COST						65.7

NO2-1-1 SEASAT B

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1554192.	139061.	319646.	621033.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	482765.	351613.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	4337524.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	16227.	22086.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	16227.	22086.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	93077.	40561.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	95833.	41982.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

V11-35

NO2-1-1 SEASAT B

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	182131.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	194.9	1.00	1202420.	302239.	772004.	0.
WIRING HARNESS	115.0	1.00	458878.	269950.	365173.	0.
THERMAL CONTROL	114.7	1.00	534452.	273079.	248074.	0.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	54.1	1.00	740187.	419928.	357537.	0.
STRUCTURE	165.1	1.00	3289269.	834127.	532648.	0.
POWER CONTROL UNITS	157.8	1.00	1638107.	495200.	632439.	0.
SOLAR ARRAY DRIVE	32.4	1.00	1056124.	563434.	719583.	0.
SATELLITE ADAPTER	92.7	1.00	180266.	87583.	55958.	0.

PROPELLANT WEIGHT 83.1

MISSION EQUIP WEIGHT 1367.0

TOTAL SATELLITE WEIGHT 2661.4

VII-36

**** SATELLITE SYSTEMS COST MODEL ****
NØ2-1-2 ENVIR MS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 486. NUMBER OF QUAL UNITS = 0
BOL POWER = 1778. ARRAY AREA = 144.4 SQ FT BATT CAP = 40. AMP-HR

✓11-37

SPACECRAFT COST MODEL

NO2-1-2 ENVIR MS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.3	1.7	6.9	5.0	4.6	9.6
THERMAL CONTROL	.8	.2	1.0	.8	.6	1.4
ELECTRICAL POWER	3.8	1.0	4.9	4.1	5.9	10.0
COMMUNICATIONS	.9	.4	1.3	1.3	1.7	3.0
DATA HANDLING	7.1	1.1	8.2	9.3	4.0	13.2
STABILITY AND CONTROL	4.2	1.6	5.8	5.7	4.3	10.0
AUXILIARY PROPULSION	1.7	.9	2.6	2.5	3.1	5.6
SPACECRAFT MISSION EQUIPMENT	23.8	6.8	30.7 39.8	28.6	24.1	52.7 69.1
SATELLITE QUALIFICATION UNIT(S)			70.5			121.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			
CONTRACTOR FEE			2.3			1.9 3.8
TOTAL SATELLITE			74.9			127.5
AVERAGE UNIT COST (4 SATELLITES)						31.9
TOTAL SATELLITE DDT+E AND RECURRING COST						202.4

VII-38

136

NO2-1-2 ENVIR MS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1322	REACTION WHEEL	1	31.0	10.0	1.00	98701.	39694.	20529.	23660.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	98213.	90519.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	938426.	139061.	258914.	408582.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2755353.	47819.	49463.	660486.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	13144.	24065.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	13144.	24065.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	75393.	44195.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	77625.	45744.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VI-39

NO2-1-2 ENVIR MS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28689.	102477.	74157.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	100.5	1.00	756385.	163678.	338646.	181313.
WIRING HARNESS	82.8	1.00	347309.	204316.	223874.	83253.
THERMAL CONTROL	34.7	1.00	480738.	121408.	99843.	115238.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	83.8	1.00	967334.	586895.	404757.	231880.
STRUCTURE	167.5	1.00	2294301.	844422.	436772.	549967.
POWER CONTROL UNITS	91.8	1.00	1111925.	360704.	373143.	266540.
SOLAR ARRAY DRIVE	16.7	1.00	673856.	320766.	331829.	161530.
SATELLITE ADAPTER	60.8	1.00	125955.	55479.	35415.	30193.
PROPELLANT WEIGHT	142.4					
MISSION EQUIP WEIGHT	625.0					

TOTAL SATELLITE WEIGHT 1641.2

VII-40

**** SATELLITE SYSTEMS COST MODEL ****
ND 2-1-73 HAIDE

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 300.1 NUMBER OF QUAL UNITS = 0
BOL POWER = 1278.1 ARRAY AREA = 103.7 SQ FT BATT CAP = 34. AMP-HR

VII-41

SPACECRAFT COST MODEL

NO2-1-3 HALOE

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.6	1.2	5.8	0.0	1.0	1.0
THERMAL CONTROL	.6	.2	.7	0.0	.2	.2
ELECTRICAL POWER	3.0	.8	3.8	.1	1.4	1.5
COMMUNICATIONS	.7	.3	1.0	.1	.4	.4
DATA HANDLING	6.3	1.1	7.4	.9	1.0	1.9
STABILITY AND CONTROL	4.1	1.2	5.3	.0	1.0	1.1
AUXILIARY PROPULSION	1.3	.7	2.1	.2	.7	1.0
SPACECRAFT MISSION EQUIPMENT	20.7	5.4	26.1 39.1	1.4	5.7	7.1 20.6
SATELLITE QUALIFICATION UNIT(S)			65.2 0.0			27.7
GSE (AGE)			1.9			.4
LAUNCH SITE SUPPORT						.5
CONTRACTOR FEE			2.0			
TOTAL SATELLITE			69.0			28.7
AVERAGE UNIT COST (1 SATELLITES)						28.7
TOTAL SATELLITE DDT+E AND RECURRING COST						97.7

27-11-42

NO2-1-3 HALOE

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1309	REACTION WHEEL	1	8.5	1.1	1.00	148118.	59540.	39803.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	101655.	101482.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	813073.	139061.	319646.	324892.
345	TAPE RECORDER	2	16.8	25.0	1.00	499633.	583549.	342303.	199646.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2421981.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	16227.	22086.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	53240.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

V11-43

ND2-1-3 HALOE

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	26.8	0.0	.10	36087.	24319.1	89915.	72824.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	72.3	1.00	599916.	120656.	308188.	0.
WIRING HARNESS	53.2	1.00	238671.	140406.	189933.	0.
THERMAL CONTROL	31.2	1.00	348620.	112964.	115829.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	58.2	1.00	752923.	444063.	378087.	0.
STRUCTURE	112.8	1.00	2038579.	603406.	385317.	0.
POWER CONTROL UNITS	63.6	1.00	916613.	291011.	371662.	0.
SOLAR ARRAY DRIVE	12.0	1.00	538580.	242205.	309330.	0.
SATELLITE ADAPTER	49.4	1.00	105576.	46164.	38721.	0.
PROPELLANT WEIGHT	127.2					
MISSION EQUIP WEIGHT	600.0					

TOTAL SATELLITE WEIGHT 1349.1

7b-11A

**** SATELLITE SYSTEMS COST MODEL ****
NPR-1-A STORMSAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1433. ARRAY AREA = 112.5 SQ FT BATT CAP. = 132. AMP-HR

✓ 11-45

SPACECRAFT COST MODEL

NO2-1-4 STORMSAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.6	1.6	7.2	5.3	4.2	9.6
THERMAL CONTROL	1.5	.3	1.8	1.5	.9	2.4
ELECTRICAL POWER	3.5	1.1	4.6	4.5	6.4	11.0
COMMUNICATIONS	2.1	.7	2.7	2.4	2.7	5.2
DATA HANDLING	8.1	1.1	9.1	10.4	4.0	14.3
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.5	.9	2.4	2.5	3.0	5.5
SPACECRAFT MISSION EQUIPMENT	26.6	7.2	33.8	32.5	25.8	58.3
			41.7			74.4
SATELLITE QUALIFICATION UNIT(S)			75.5			132.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.2			
CONTRACTOR FEE			2.5			2.0
						4.2
TOTAL SATELLITE			80.3			138.9
AVERAGE UNIT COST (4 SATELLITES)						34.7
TOTAL SATELLITE DDT+E AND RECURRING COST						219.2

NO2-1-4 STORMSAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1091767.	139061.	258914.	475346.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3157151.	47819.	49463.	756801.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

7-11-47

NO2-1-4 STORMSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	4	47.5	0.0	.10	109009.	60591.	216433.	196218.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	78.4	1.00	635115.	130053.	269077.	152244.
WIRING HARNESS	85.1	1.00	355473.	209119.	229136.	85210.
THERMAL CONTROL	83.6	1.00	896779.	220374.	166999.	214967.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.3	1.00	883267.	535285.	369164.	211728.
STRUCTURE	168.5	1.00	2568622.	848705.	438987.	615725.
POWER CONTROL UNITS	111.0	1.00	980098.	403090.	416991.	234939.
SOLAR ARRAY DRIVE	13.0	1.00	568616.	259258.	268199.	136303.
SATELLITE ADAPTER	66.9	1.00	136618.	63924.	37452.	32749.
PROPELLANT WEIGHT	191.1					
MISSION EQUIP WEIGHT	680.0					

TOTAL SATELLITE WEIGHT 1904.4

87-11A

**** SATELLITE SYSTEMS COST MODEL ****
NPR-15 ERBS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 324. NUMBER OF QUAL UNITS = 0
BOL POWER = 467. ARRAY AREA = 78.9 SQ FT BATT CAP = 9. AMP-HR

67-1117

SPACECRAFT COST MODEL

NO2-1-5 ERBSS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.6	1.7	3.4	0.0	1.1	1.1
THERMAL CONTROL	.4	.2	.6	0.0	.2	.2
ELECTRICAL POWER	2.0	.6	2.6	.0	1.0	1.0
COMMUNICATIONS	.8	.3	1.1	.0	.4	.4
DATA HANDLING	2.2	.3	2.5	.2	.5	.7
STABILITY AND CONTROL	4.0	1.1	5.2	.0	1.0	1.1
AUXILIARY PROPULSION	1.0	.5	1.4	.2	.5	.7
SPACECRAFT MISSION EQUIPMENT	12.1	4.6	16.7	.5	4.7	5.2
			7.8			3.1
SATELLITE QUALIFICATION UNIT(S)			24.5			8.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.3			
CONTRACTOR FEE			1.3			.3
						.4
TOTAL SATELLITE			27.0			9.0
AVERAGE UNIT COST (1 SATELLITES)						9.0
TOTAL SATELLITE DDT+E AND RECURRING COST						36.0

VII-50

NO2-1-5 ERBSS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24914.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23850.	29043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	308226.	139061.	319646.	123163.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1012245.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	53240.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

✓ 11-57

NO2-1-5 ERBSs

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
205	BATTERY	2	14.4	0.0	.10	12215.	15570.	57568.	24651.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	38.8	1.00	495450.	67802.	173186.	0.
WIRING HARNESS	29.0	1.00	142672.	83932.	113538.	0.
THERMAL CONTROL	36.1	1.00	226155.	124708.	126147.	0.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	33.6	1.00	543207.	291694.	248356.	0.
STRUCTURE	256.4	1.00	919173.	1212627.	774347.	0.
POWER CONTROL UNITS	52.1	1.00	508646.	258963.	330732.	0.
SATELLITE ADAPTER	33.8	1.00	50978.	23126.	31012.	0.
PROPELLANT WEIGHT	14.5					
MISSION EQUIP WEIGHT	55.0					
TOTAL SATELLITE WEIGHT	656.8					

✓ 11-52

**** SATELLITE SYSTEMS COST MODEL ****

NCI-1-1 HOTLINE

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APDGE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 2000. ARRAY AREA = 160.0 SQ FT BATT CAP = 120. AMP-HR

VII-53

C-7

SPACECRAFT COST MODEL

NC1-1-1 HOTLINE

(MILLIONS OF 1977 DOLLARS)

VII-54

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	9.2	6.9	16.1	6.4	12.4	18.9
THERMAL CONTROL	2.0	.4	2.3	1.4	.8	2.2
ELECTRICAL POWER	4.3	1.3	5.6	3.8	5.9	9.7
COMMUNICATIONS	2.0	.9	2.9	3.4	3.9	7.3
DATA HANDLING	11.6	.8	12.4	12.2	4.7	16.9
STABILITY AND CONTROL	6.8	3.6	10.5	15.1	6.8	21.9
AUXILIARY PROPULSION	1.7	.9	2.5	1.6	2.1	3.7
SPACECRAFT MISSION EQUIPMENT	37.5	14.8	52.3	44.0	36.7	80.7
			108.1			152.6
SATELLITE QUALIFICATION UNIT(S)			160.4			233.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.9			2.3
CONTRACTOR FEE			3.9			5.8
TOTAL SATELLITE			167.2			241.5
AVERAGE UNIT COST (3 SATELLITES)						80.5
TOTAL SATELLITE DDT+E AND RECURRING COST						408.6

NCL-1-1 HOTLINE

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	2	1.8	35.2	1.00	74092.	56610.	38863.	34195.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.	37829.	156734.	165402.
1318	REACTION WHEEL	2	19.5	10.5	.25	77723.	47779.	92740.	81053.
1461	SUN SENSOR ELECTR	1	5.0	4.6	.10	100419.	12587.	102718.	187059.
1815	EARTH SENSOR	2	15.4	15.6	.10	130477.	50338.	429460.	340169.
1901	CONTROL ELECT.	3	10.3	25.5	2.00	3380882.	2430207.	785615.	2144309.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55133.	52474.
842	THRUSTER	2	1.0	0.0	.10	12974.	18388.	28957.	33824.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	1	15.0	20.0	.50	942656.	109091.	206632.	351192.
209	DIGITAL TELEMETRY	2	18.5	14.0	.75	1590289.	168931.	330851.	552809.
430	COMMAND DIST UNIT	2	26.0	4.8	.75	4301722.	286813.	561722.	1495346.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.	34419.	201328.	104658.
327	TRANSMITTER	2	4.7	18.0	.25	68239.	22644.	145567.	71163.
401	RECEIVER	2	3.9	6.3	.25	21487.	10529.	45979.	22407.
424	RECEIVER	2	5.0	3.0	.25	53458.	24116.	103892.	55748.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62395.	25814.	32645.	28792.

VII-55

NCI-1-1 HOTLINE

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
266	BATTERY	4	50.0	0.0	.10	100862.1	62846.	226837.	187884.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	110.0	1.00	812599.	177957.	384646.	190643.
WIRING HARNESS	100.0	1.00	407592.	239780.	274476.	95613.
THERMAL CONTROL	105.0	1.00	1158291.	257200.	199347.	271713.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	80.0	1.00	972584.	566425.	408100.	228220.
STRUCTURE	1170.0	1.00	4309307.	4406614.	2381172.	1010880.
POWER CONTROL UNITS	140.0	1.00	1191154.	461713.	498986.	279422.
SOLAR ARRAY DRIVE	25.0	1.00	885863.	451990.	488477.	207807.
SATELLITE ADAPTER	100.0	1.00	192263.	156092.	49499.	45101.
PROPELLANT WEIGHT	400.0					
MISSION EQUIP WEIGHT	2100.0					

TOTAL SATELLITE WEIGHT 4850.0

VII-56

**** SATELLITE SYSTEMS COST MODEL ****
NC 1-1-2 INGOVT-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19300. NUMBER OF QUAL UNITS = 0
BOL POWER = 2000. ARRAY AREA = 160.0 SQ FT BATT CAP = 120. AMP-HR

VII-57

SPACECRAFT COST MODEL

NC1-1-2 INQJVT-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	10.6	7.3	17.8	7.4	13.0	20.4
THERMAL CONTROL	2.4	.4	2.7	1.7	.9	2.5
ELECTRICAL POWER	4.3	1.3	5.6	3.8	5.9	9.7
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	14.7	.9	15.6	20.0	7.5	27.5
STABILITY AND CONTROL	7.6	4.7	12.4	21.3	8.6	29.9
AUXILIARY PROPULSION	1.9	1.1	2.9	2.0	2.7	4.7
SPACECRAFT MISSION EQUIPMENT	43.6	16.6	53.2 110.2	60.1	43.2	103.3 198.4
SATELLITE QUALIFICATION UNIT(S)			170.4 0.0			301.8
GSE (AGE)			1.1			
LAUNCH SITE SUPPORT						2.8
CONTRACTOR FEE			4.3			7.4
TOTAL SATELLITE			175.8			312.0
AVERAGE UNIT COST (3 SATELLITES)						104.0
TOTAL SATELLITE DDT+E AND RECURRING COST						487.8

VII-58

NCI-1-2 INGOVT-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.	79920.	54810.	51745.
112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.	37829.	156734.	165402.
206	EARTH SENSOR	2	3.3	6.5	.10	85866.	33513.	291524.	226470.
318	REACTION WHEEL	4	19.5	10.5	.25	93442.	87126.	166932.	136384.
301	CONTROL ELECT.	4	10.3	25.5	2.00	3591372.	3139018.	1002670.	2876020.
115	STAR SENSOR ASSY	2	23.0	3.0	.10	274142.	56610.	352177.	714721.

AUXILIARY PROPULSION

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
329	THRUSTER	12	.6	0.0	.10	15068.	62143.	99239.	93676.
342	THRUSTER	4	1.0	0.0	.10	14433.	31260.	52122.	52665.

DATA PROCESSING AND INSTRUMENTATION

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.75	2378360.	168931.	595533.	1157115.
330	COMMAND DIST UNIT	3	25.0	4.8	.75	5234961.	286813.	792222.	2215221.

COMMUNICATIONS

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.	50553.	270002.	148817.
301	RECEIVER	2	3.9	6.3	.25	21487.	10529.	45979.	22407.
324	RECEIVER	3	5.0	3.0	.25	58864.	34046.	146524.	74726.
303	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
309	COMMAND SIG COND	1	10.7	15.0	1.00	81652.	81652.	88233.	19154.
312	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.	25814.	32645.	28792.

V11-59

NC1-1-2 INGV-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	4	50.0	0.0	.10	100862.	62846.	226837.	187884.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	110.0	1.00	812599.	177957.	384646.	190643.
WIRING HARNESS	100.0	1.00	407592.	239780.	274476.	95613.
THERMAL CONTROL	110.0	1.00	1390857.	265441.	204847.	326270.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.0	1.00	1077815.	671860.	484064.	252835.
STRUCTURE	1240.0	1.00	5096392.	4629728.	2501735.	1195515.
POWER CONTRL UNITS	140.0	1.00	1191154.	461713.	498986.	279422.
SOLAR ARRAY DRIVE	25.0	1.00	885868.	451990.	488477.	207807.
SATELLITE ADAPTER	125.0	1.00	232419.	189089.	56401.	54521.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	2800.0					

TOTAL SATELLITE WEIGHT 5950.0

VII-60

**** SATELLITE SYSTEMS COST MODEL ****
NCI-1-3 INGPVT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 3500. ARRAY AREA = 270.0 SQ FT BATT CAP = 150. AMP-HR

✓
19-11-61

✓

SPACECRAFT COST MODEL

NC1-1-3 INGOVT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	11.6	7.7	19.3	8.2	13.9	22.1
THERMAL CONTROL	2.5	.4	2.9	1.8	.9	2.7
ELECTRICAL POWER	6.0	1.6	7.6	5.2	7.6	12.8
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	16.0	.9	16.8	21.6	7.5	29.1
STABILITY AND CONTROL	7.6	4.7	12.4	21.3	8.6	29.9
AUXILIARY PROPULSION	1.9	1.1	2.9	2.0	2.7	4.7
SPACECRAFT MISSION EQUIPMENT	47.7	17.4	65.1 155.2	64.0	45.9	109.9 225.5
SATELLITE QUALIFICATION UNIT(S)			229.2 3.0			335.4
GSE (AGE)			3.5			
LAUNCH SITE SUPPORT						2.9
CONTRACTOR FEE			4.8			7.9
TOTAL SATELLITE			229.5			346.1
AVERAGE UNIT COST (3 SATELLITES)						115.4
TOTAL SATELLITE DDT+E AND RECURRING COST						574.6

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NC1-1-3 INGOVT-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.	37829.	156734.	165402.
1206	EARTH SENSOR	2	9.8	5.5	.10	66856.	33513.	291524.	226470.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.	87126.	166932.	136384.
1901	CONTROL ELECT.	4	10.3	26.5	2.00	3691372.	3139018.	1002670.	2876020.
2115	STAR SENSOR ASSY	2	23.0	8.0	.10	274142.	56610.	352177.	714721.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.5	0.0	.10	15068.	62143.	99239.	93676.
842	THRUSTER	4	1.0	0.0	.10	14433.	31260.	52122.	52665.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.75	2621354.	168931.	595533.	1275336.
430	COMMAND DIST UNIT	3	26.0	4.8	.75	5713625.	286813.	792222.	2417772.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58854.	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.	25814.	32645.	28792.

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NC1-1-3 INGVDT-2

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
IDENT	TYPE								
269	BATTERY	3	70.0	0.0	.10	120979.	65093.	234947.	225357.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	190.0	1.00	1172195.	295196.	638053.	274973.
WIRING HARNESS	150.0	1.00	574845.	338172.	387105.	134848.
THERMAL CONTROL	118.0	1.00	1471927.	278381.	213435.	345286.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.0	1.00	1077915.	671860.	484064.	252835.
STRUCTURE	1300.0	1.00	5514169.	4819466.	2604262.	1293517.
POWER CONTRL UNITS	150.0	1.00	1652515.	480730.	519537.	387648.
SOLAR ARRAY DRIVE	32.0	1.00	1047265.	557516.	602522.	245668.
SATELLITE ADAPTER	150.0	1.00	271373.	208101.	62749.	63660.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	3200.0					

TOTAL SATELLITE WEIGHT 6600.0

VII-64

**** SATELLITE SYSTEMS COST MODEL ****
VC1-1-4 INGV-3

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 5000. ARRAY AREA = 400.0 SQ FT BATT CAP = 150. AMP-HR

VII-65

SPACECRAFT COST MODEL

NC1-1-4 INGOVT-3

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	13.2	7.9	21.1	9.3	14.5	23.8
THERMAL CONTROL	2.6	.4	2.9	1.8	.9	2.7
ELECTRICAL POWER	7.3	1.8	9.2	6.2	8.8	15.0
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	18.4	.9	19.3	24.9	7.5	32.4
STABILITY AND CONTROL	7.6	4.7	12.4	21.3	8.6	29.9
AUXILIARY PROPULSION	1.9	1.1	2.9	2.0	2.7	4.7
SPACECRAFT MISSION EQUIPMENT	53.2	17.8	71.0 195.8	69.4	47.6	117.1 290.7
SATELLITE QUALIFICATION UNIT(S)			265.8 0.0			407.8
GSE (AGE)			3.7			
LAUNCH SITE SUPPORT						3.0
CONTRACTOR FEE			5.2			8.4
TOTAL SATELLITE			275.8			419.2
AVERAGE UNIT COST (3 SATELLITES)						139.7
TOTAL SATELLITE DDT+E AND RECURRING COST						695.0

NCI-1-4 INGOVT-3

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	156734.	165402.
1206	EARTH SENSOR	2	9.8	6.5	.10	86866.1	33513.	291524.	226470.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	166932.	136384.
1901	CONTROL ELECT.	4	10.3	26.5	2.00	3591372.1	3139018.	1002670.	2876020.
2115	STAR SENSOR ASSY	2	23.0	8.0	.10	274142.1	56610.	352177.	714721.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.1	62143.	99239.	93676.
842	THRUSTER	4	1.0	0.0	.10	14433.1	31260.	52122.	52665.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.75	3119651.1	168931.	595533.	1517771.
430	COMMAND DIST UNIT	3	26.0	4.8	.75	6581753.1	286813.	792222.	2827445.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58854.1	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	32645.	28792.

VII-67

NC1-1-4 INGOVT-3

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	3	70.0	0.0	.10	120979.	65093.	234947.	225357.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	275.0	1.00	1543433.	415726.	898573.	362059.
WIRING HARNESS	160.0	1.00	607183.	357196.	408882.	142433.
THERMAL CONTROL	115.0	1.00	1502549.	273563.	210243.	352469.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.0	1.00	1077816.	671860.	484064.	252835.
STRUCTURE	1300.0	1.00	5290959.	4819466.	2604262.	1475737.
POWER CONTROL UNITS	155.0	1.00	2035931.	490040.	529599.	477590.
SOLAR ARRAY DRIVE	40.0	1.00	1218322.	673954.	728360.	285795.
SATELLITE ADAPTER	145.0	1.00	263669.	241451.	61517.	61852.

PROPELLANT WEIGHT 500.0

MISSION EQUIP WEIGHT 4200.0

TOTAL SATELLITE WEIGHT 7700.0

89-111

**** SATELLITE SYSTEMS COST MODEL ****
NC2-1-1 VOTE-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1000. ARRAY AREA = 80.0 SQ FT BATT CAP = 120. AMP-HR

69-117

SPACECRAFT COST MODEL

NC2-1-1 VOTE-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.4	5.1	11.5	4.5	9.1	13.6
THERMAL CONTROL	2.0	.3	2.3	1.4	.7	2.1
ELECTRICAL POWER	3.1	1.2	4.3	3.0	5.2	8.2
COMMUNICATIONS	2.0	.9	2.9	3.4	3.9	7.3
DATA HANDLING	9.8	1.0	10.8	13.1	5.9	19.0
STABILITY AND CONTROL	6.8	3.6	10.5	15.1	6.8	21.9
AUXILIARY PROPULSION	1.7	.9	2.5	1.6	2.1	3.7
SPACECRAFT MISSION EQUIPMENT	31.8	13.0	44.8 42.6	42.1	33.8	75.9 6.4
SATELLITE QUALIFICATION UNIT(S)			87.4 0.0			82.3
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT						2.1
CONTRACTOR FEE			3.3			5.5
TOTAL SATELLITE			93.3			89.9
AVERAGE UNIT COST (3 SATELLITES)						30.0
TOTAL SATELLITE DDT+E AND RECURRING COST						183.2

NC2-1-1 VOTE-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	2	1.8	35.2	1.00	74092.1	56610.	38863.	34195.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	156734.	165402.
1318	REACTION WHEEL	2	19.5	10.5	.25	77723.1	47779.	92740.	81053.
1461	SUN SENSOR ELECTR	1	6.0	4.6	.10	100419.1	12587.	102718.	187059.
1815	EARTH SENSOR	2	15.4	15.6	.10	130477.1	50338.	429460.	340169.
1901	CONTROL ELECT.	3	10.3	26.5	2.00	338088.1	2430207.	785615.	2144309.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.1	33143.	55133.	52474.
842	THRUSTER	2	1.0	0.0	.10	12974.1	18388.	28957.	33824.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	1	15.0	20.0	.50	942656.1	109091.	206632.	351192.
209	DIGITAL TELEMTRY	2	13.5	14.0	1.00	1248320.1	225241.	438117.	576113.
430	COMMAND DIST UNIT	2	26.0	4.8	1.00	3561535.1	382417.	743840.	1643688.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
327	TRANSMITTER	2	4.7	18.0	.25	68239.1	22644.	145567.	71163.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	2	5.0	3.0	.25	53458.1	24116.	103892.	55748.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.1	32645.	28792.

14-71

NC2-1-1 VDTE-1

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
IDENT	TYPE	3	66.7	0.0	.10	100862.1	62846.	226837.	187884.
266	BATTERY								

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.0	1.00	500275.	93662.	202445.	117355.
WIRING HARNESS	105.0	1.00	424813.1	249903.	286070.	99652.
THERMAL CONTROL	80.0	1.00	1181344.	213894.	170029.	277120.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	80.0	1.00	972884.	566425.	408100.	228220.
STRUCTURE	830.0	1.00	2996660.1	3291269.	1778481.	702959.
POWER CONTROL UNITS	140.0	1.00	794082.	461713.	498986.	186276.
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	316427.	146976.
SATELLITE ADAPTER	75.0	1.00	150556.	98957.	41832.	35318.

PROPELLANT WEIGHT 400.0

MISSION EQUIP WEIGHT 700.0

TOTAL SATELLITE WEIGHT 3000.0

VI-72

**** SATELLITE SYSTEMS COST MODEL ****
NCR-1-2 VOTE-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BDL POWER = 50000. ARRAY AREA = 1965.0 SQ FT BATT CAP = 600. AMP-HR

VII-73

SPACECRAFT COST MODEL

NC2-1-2 VOTE II

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	19.8	12.1	31.9	0.0	9.4	9.4
THERMAL CONTROL	3.4	.5	3.9	0.0	.5	.5
ELECTRICAL POWER	16.6	3.8	20.4	1.3	9.3	10.5
COMMUNICATIONS	2.1	1.0	3.1	1.2	1.7	2.9
DATA HANDLING	16.9	.7	17.6	11.9	2.6	14.5
STABILITY AND CONTROL	8.3	5.8	14.1	11.6	4.3	15.9
AUXILIARY PROPULSION	2.1	1.3	3.4	.4	1.3	1.7
SPACECRAFT MISSION EQUIPMENT	69.2	25.2	94.4 275.0	26.5	28.9	55.3 164.0
SATELLITE QUALIFICATION UNIT(S)			369.4 0.0			219.3 0.0
GSE (AGE)			4.5			1.3
LAUNCH SITE SUPPORT			5.9			4.0
CONTRACTOR FEE						
TOTAL SATELLITE			380.9			224.5
AVERAGE UNIT COST (1 SATELLITES)						224.5
TOTAL SATELLITE DDT+E AND RECURRING COST						605.4

NC2-1-2 VOTE II

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	64772.	57415.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	160549.	179185.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	537519.	412825.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	170996.	147749.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001861.1	3847828.	1431727.	4733130.
2115	STAR SENSOR ASSY	4	23.0	3.0	.10	329587.1	103230.1	649352.	1302843.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	143369.	150220.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	75300.	76476.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1548705.1	185454.	380993.	592388.
209	DIGITAL TELEMETRY	4	18.5	14.0	.50	2900997.1	112621.1	610030.	2293504.
430	COMMAND DIST UNIT	3	26.0	4.8	.50	6308855.1	191209.	811508.	4131889.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	42488.	14021.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	158904.	184625.1
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	104712.	115169.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	206229.	113380.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	276575.	161218.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	47098.	24275.
424	RECEIVER	3	5.0	3.0	.25	58854.1	34046.	150091.	80953.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	41640.	8053.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	104269.	0.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	38578.	24929.

VII-75

NC2-1-2 VOTE II

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
276	BATTERY	3	120.0	0.0	.10	374445.1	95957.	354778.	755635.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	1375.0	1.00	4703265.	1845243.	4713265.	0.
WIRING HARNESS	220.0	1.00	795427.	457936.	632996.	0.
THERMAL CONTROL	175.0	1.00	1979709.	353650.	317624.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	678519.	0.
STRUCTURE	1900.0	1.00	8647185.	6654074.	4249089.	0.
POWER CONTROL UNITS	245.0	.50	3915011.	320273.	818065.	0.
SOLAR ARRAY DRIVE	125.0	1.00	2637974.	1775224.	2267208.	0.
SATELLITE ADAPTER	200.0	1.00	346555.	370086.	87745.	0.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	6300.0					
TOTAL SATELLITE WEIGHT	12100.0					

VII-76

**** SATELLITE SYSTEMS COST MODEL ****
NCB-HI PRSNL COM

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 10000. ARRAY AREA = 800.0 SQ FT BATT CAP = 150. AHP-HI

MI-77

SPACECRAFT COST MODEL

NC3-1-1 PRSNL COM

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	16.7	12.6	29.3	16.0	29.3	45.3
THERMAL CONTROL	2.5	.6	3.1	2.4	1.6	4.0
ELECTRICAL POWER	9.5	2.2	11.7	10.4	16.0	26.4
COMMUNICATIONS	2.1	1.0	3.1	5.0	6.0	11.0
DATA HANDLING	16.0	.7	16.7	40.3	9.9	50.1
STABILITY AND CONTROL	7.7	4.8	12.4	27.3	12.5	39.8
AUXILIARY PROPULSION	1.7	.9	2.5	2.2	2.7	4.8
SPACECRAFT	56.3	22.7	79.0	103.5	78.0	181.5
MISSION EQUIPMENT			267.5			518.0
SATELLITE			346.5			699.6
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			3.9			
LAUNCH SITE SUPPORT						4.5
CONTRACTOR FEE			5.8			13.0
TOTAL SATELLITE			355.2			717.0
AVERAGE UNIT COST (4 SATELLITES)						179.3
TOTAL SATELLITE DDT+E AND RECURRING COST						1073.2

NC3-1-1 PRSNL COM

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	52465.	47673.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	155112.	159828.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	519317.	368229.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	165206.	131789.
1901	CONTROL ELECT.	4	10.3	26.5	2.00	3591372.1	3139018.	959770.	2618157.
2115	STAR SENSOR ASSY	2	23.0	8.0	.10	274142.1	56610.	348534.	690638.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.1	33143.	54563.	50706.
842	THRUSTER	2	1.0	0.0	.10	12974.1	18388.	28657.	32684.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	368091.	528394.
209	DIGITAL TELEMETRY	4	18.5	14.0	.50	2717381.1	112621.	589372.	1916262.1
430	COMMAND DIST UNIT	3	25.0	4.8	.50	5565673.1	191209.	784028.	3475045.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41050.	12506.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	128713.	201169.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	84817.	125488.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.1	199245.	101132.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	267209.	143802.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45503.	21652.
424	RECEIVER	3	5.0	3.0	.25	58864.1	34046.	145008.	72208.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.1	33728.	8775.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	84458.	19573.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	31248.	27162.

6/11/79

NC3-1-1 PRSNL COM

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	3	70.0	0.0	.10	120979.	65093.	232517.	217764.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	550.0	1.00	2507314.1	789880.	1634242.	601028.
WIRING HARNESS	175.0	1.00	655122.	385397.	422289.	157039.
THERMAL CONTROL	205.0	1.00	1495231.	404830.	282228.	358422.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	80.0	1.00	972884.1	566425.	390640.	233210.
STRUCTURE	2280.0	1.00	7726445.	7769475.	4018711.	1852107.
POWER CONTROL UNITS	165.0	.75	2290481.	381221.	525825.	549052.
SOLAR ARRAY DRIVE	65.0	1.00	1693249.	1018254.	1053370.	405889.
SATELLITE ADAPTER	250.0	1.00	418934.1	336366.	80984.	100423.

PROPELLANT WEIGHT 400.0

MISSION EQUIP WEIGHT 6100.0

TOTAL SATELLITE WEIGHT 11000.0

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**** SATELLITE SYSTEMS COST MODEL ****
NC3-1-2 TELECOM-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BDL POWER = 25000. ARRAY AREA = 1200.0 SQ FT BATT CAP = 280. AMP-HR

✓11-81

SPACECRAFT COST MODEL

NC3-1-2 TELECON-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	19.3	14.3	33.6	13.6	26.3	39.8
THERMAL CONTROL	3.1	.6	3.7	2.2	1.3	3.5
ELECTRICAL POWER	11.9	2.8	14.7	10.0	17.0	27.1
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	18.2	.7	18.9	35.6	7.5	43.1
STABILITY AND CONTROL	8.3	5.8	14.1	28.4	11.7	40.1
AUXILIARY PROPULSION	2.1	1.3	3.4	2.5	3.4	5.9
SPACECRAFT MISSION EQUIPMENT	65.0	26.5	91.5	96.2	71.8	168.0
			308.2			468.3
SATELLITE QUALIFICATION UNIT(S)			399.7			636.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			4.3			
CONTRACTOR FEE			5.7			3.7
						12.0
TOTAL SATELLITE			410.7			652.1
AVERAGE UNIT COST (3 SATELLITES)						217.4
TOTAL SATELLITE DDT+E AND RECURRING COST						1062.8

NC3-1-2 TELECON-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	33.2	1.00	81585.1	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	3.8	.50	260582.1	37829.	156734.	165402.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	524745.	381069.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	166932.	136384.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001851.1	3847828.	1211540.	3626769.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	633920.	1202624.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	139962.	138664.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	73510.	70593.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.50	3159901.1	112621.	595533.	2306023.
430	COMMAND DIST UNIT	3	26.0	4.8	.50	6489083.1	191209.	792222.	4118871.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58864.1	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.1	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	32645.	28792.

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NC3-1-2 TELECON

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
272	BATTERY	4	85.0	0.0	.10	201201.0	92088.	332382.	374792.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	820.0	1.00	3330217.	1143344.	2471285.	781204.
WIRING HARNESS	240.0	1.00	856339.	503769.	576664.	200880.
THERMAL CONTROL	225.0	1.00	1852133.	431205.	311344.	434475.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	574169.	283641.
STRUCTURE	2600.0	1.00	8828037.	8687091.	4694185.	2070887.
POWER CONTRL UNITS	200.0	.50	2609939.	284420.	614761.	612241.
SOLAR ARRAY DRIVE	85.0	1.00	2031007.	1279044.	1382297.	476435.
SATELLITE ADAPTER	290.0	1.00	475254.	399539.	92278.	111488.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	7200.0					
TOTAL SATELLITE WEIGHT	13200.0					

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**** SATELLITE SYSTEMS COST MODEL ****
NC3-1-3 TELECON-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 99000. ARRAY AREA = 3360.0 SQ FT BATT CAP = 400. AMP-HR

VII-85

SPACECRAFT COST MODEL

NC3-1-3 TELECON-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	25.0	16.9	41.9	10.0	23.8	33.8
THERMAL CONTROL	3.1	.6	3.7	1.2	1.0	2.2
ELECTRICAL POWER	18.6	5.2	23.8	9.0	24.1	33.1
COMMUNICATIONS	2.1	1.0	3.1	2.7	3.2	5.9
DATA HANDLING	16.7	.6	17.3	27.8	5.1	32.8
STABILITY AND CONTROL	8.3	5.8	14.1	20.8	8.1	28.9
AUXILIARY PROPULSION	2.1	1.3	3.4	1.6	2.3	3.9
SPACECRAFT MISSION EQUIPMENT	75.9	31.4	107.3	73.1	67.6	140.6
			365.9			405.9
SATELLITE QUALIFICATION UNIT(S)			473.3			546.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			4.9			2.8
CONTRACTOR FEE			7.9			10.0
TOTAL SATELLITE			485.0			559.3
AVERAGE UNIT COST (2 SATELLITES)						279.7
TOTAL SATELLITE DDT+E AND RECURRING COST						1045.3

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NC3-1-3 TELECON-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.0	79920.	58295.	56479.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.0	37829.	158531.	171774.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.0	61112.	530763.	395751.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.0	87126.	168847.	141639.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001851.0	3847828.	1288557.	4111754.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.0	103230.	641190.	1248959.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.0	91143.	141567.	144007.
842	THRUSTER	6	1.0	0.0	.10	15893.0	44132.	74353.	73313.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048795.0	185454.	376203.	567887.
209	DIGITAL TELEMTRY	4	18.5	14.0	.40	2905494.0	90096.	602362.	2752570.
430	COMMAND DIST UNIT	3	26.0	4.8	.40	5383671.0	152967.	801308.	4848099.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.0	6850.	41954.	13441.
203	ANTENNA	2	10.4	0.0	1.00	462041.0	268784.	143014.	221512.
221	ANTENNA	2	5.8	0.0	1.00	288220.0	182284.	94241.	138178.
326	TRANSMITTER	2	8.0	25.0	.25	100358.0	34419.	203637.	108691.
345	TRANSMITTER	2	13.0	130.0	.25	142702.0	50553.	273099.	154550.
401	RECEIVER	2	3.9	6.3	.25	21487.0	10529.	46506.	23271.
424	RECEIVER	3	5.0	3.0	.25	58864.0	34046.	148204.	77605.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.0	30796.	37476.	9662.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.0	81652.	93842.	16313.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.0	25814.	34720.	29909.

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NC3-1-3 TELECON-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
275	BATTERY	2	100.0	0.0	.10	269075.1	62846.	229439.	520540.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	2350.0	1.00	6846729.	3031057.	6967963.	1367928.
WIRING HARNESS	250.0	1.00	886501.	521513.	634926.	177117.
THERMAL CONTROL	250.0	1.00	1825952.	463135.	352188.	364812.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	610668.	241578.
STRUCTURE	2750.0	1.00	10571789.	9111289.	5236384.	2112169.
POWER CONTRL UNITS	200.0	.25	2919121.	142210.	653841.	583220.
SOLAR ARRAY DRIVE	200.0	1.00	3627971.	2647007.	3042543.	724843.
SATELLITE ADAPTER	300.0	1.00	489159.	494575.	100110.	97730.

PROPELLANT WEIGHT 500.0

MISSION EQUIP WEIGHT 8800.0

TOTAL SATELLITE WEIGHT 16500.0

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**** SATELLITE SYSTEMS COST MODEL ****
NC A-1-2 MAIL-II

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 15000. ARRAY AREA = 1000.0 SQ FT BATT CAP = 180. AMP-HR

V11-89

SPACECRAFT COST MODEL

NC4-1-2 MAIL-II

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	16.5	9.9	26.4	11.6	18.8	30.4
THERMAL CONTROL	2.9	.4	3.4	2.1	1.0	3.1
ELECTRICAL POWER	11.4	2.6	13.9	9.2	14.6	23.7
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	17.8	.8	18.6	29.5	7.5	37.0
STABILITY AND CONTROL	8.3	5.8	14.1	28.4	11.7	40.1
AUXILIARY PROPULSION	2.1	1.3	3.4	2.5	3.4	5.9
SPACECRAFT MISSION EQUIPMENT	61.1	21.8	82.9 241.8	87.1	61.6	148.7 364.3
SATELLITE QUALIFICATION UNIT(S)			324.7 0.0			512.9
GSE (AGE)			4.1			
LAUNCH SITE SUPPORT						3.5
CONTRACTOR FEE			5.1			10.6
TOTAL SATELLITE			335.0			527.0
AVERAGE UNIT COST (3 SATELLITES)						175.7
TOTAL SATELLITE DDT+E AND RECURRING COST						862.0

NC4-1-2 MAIL-II

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81535.1	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	156734.	165402.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.	61112.	524745.	381069.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	166932.	136384.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001851.1	3847828.	1211540.	3626769.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	633920.	1202624.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	139962.	138664.
842	THRUSTER	6	1.0	0.0	.10	15899.1	44132.	73510.	70593.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP. PROCESR	2	15.0	20.0	.50	1048705.1	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	13.5	14.0	.60	3043318.1	135145.	595533.	1850787.
430	COMMAND DIST UNIT	3	25.0	4.8	.60	6389464.1	229450.	792222.	3379700.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58854.1	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	32645.	28792.

VII-91

NC4-1-2 MAIL-II

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
272	BATTERY	3	80.0	0.0	.10	140350.	71662.	258657.	261459.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	690.0	1.00	2931201.	974450.	2106228.	687603.
WIRING HARNESS	190.0	1.00	702440.	413233.	473028.	164779.
THERMAL CONTROL	145.0	1.00	1719427.	320119.	240777.	403344.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	574169.	283641.
STRUCTURE	1600.0	1.00	7508510.	5749751.	3106954.	1761351.
POWER CONTROL UNITS	180.0	.75	2903523.	401128.	578013.	681134.
SOLAR ARRAY DRIVE	75.0	1.00	1855755.	1149957.	1242789.	437672.
SATELLITE ADAPTER	180.0	1.00	316863.	305981.	69812.	74331.

PROPELLANT WEIGHT 500.0

MISSION EQUIP WEIGHT 5400.0

TOTAL SATELLITE WEIGHT 9900.0

VII-92

**** SATELLITE SYSTEMS COST MODEL ****
NC5-1-1 TVBCST-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 10000. ARRAY AREA = 800.0 SQ FT BATT CAP = 150. AMP-HR

V11-93

SPACECRAFT COST MODEL

NC5-1-1 TV BCST-1'

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	15.0	9.4	24.5	17.8	27.3	45.1
THERMAL CONTROL	2.8	.4	3.2	3.3	1.5	4.8
ELECTRICAL POWER	9.5	2.2	11.7	12.8	19.4	32.1
COMMUNICATIONS	2.1	1.0	3.1	6.0	7.4	13.4
DATA HANDLING	16.2	.8	17.0	41.8	12.2	54.0
STABILITY AND CONTROL	8.3	5.8	14.1	41.0	18.6	59.6
AUXILIARY PROPULSION	2.1	1.3	3.4	4.1	5.3	9.4
SPACECRAFT MISSION EQUIPMENT	56.0	20.9	77.0 205.9	126.7	91.7	218.4 484.2
SATELLITE QUALIFICATION UNIT(S)			283.8 0.0			702.6
GSE (AGE)			3.9			
LAUNCH SITE SUPPORT						5.6
CONTRACTOR FEE			5.7			15.7
TOTAL SATELLITE			293.4			723.8
AVERAGE UNIT COST (5 SATELLITES)						144.8
TOTAL SATELLITE DDT+E AND RECURRING COST						1017.2

76-11A

NC5-1-1 IV BCSI-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	50716.	44363.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	153635.	154889.
1206	EARTH SENSOR	4	9.8	5.5	.10	104434.	61112.	514372.	356848.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	163632.	127715.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001851.1	3847828.	1121029.	3012857.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	621388.	1126184.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	137195.	129851.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	72057.	66106.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	364585.	512063.
209	DIGITAL TELEMETRY	4	18.5	14.0	.60	2713383.1	135145.	583760.	1545253.
430	COMMAND DIST UNIT	3	26.0	4.8	.60	5762903.1	229450.	776561.	2854529.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COS	VEHICLE ENG. COS
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	40659.	12120.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	124421.	189891.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	81988.	118454.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	197348.	98006.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	264665.	139358.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45070.	20983.
424	RECEIVER	3	5.0	3.0	.25	59864.1	34046.	143627.	69976.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	32603.	8283.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	81642.	19314.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	30206.	25640.

VI-95

NC5-1-1 IV BCST-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	3	70.0	0.0	.10	120979.1	65093.	230303.	211033.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	550.0	1.00	2507314.	789880.	1579741.	593096.
WIRING HARNESS	175.0	1.00	655122.	385397.	408206.	154967.
THERMAL CONTROL	135.0	1.00	1651562.	304979.	213667.	390671.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	531274.	286018.
STRUCTURE	1530.0	1.00	5855323.	5535218.	2767576.	1621602.
POWER CONTRL UNITS	165.0	.75	2290481.	381221.	508289.	541805.
SOLAR ARRAY DRIVE	65.0	1.00	1693249.	1018254.	1018241.	400532.
SATELLITE ADAPTER	170.0	1.00	301941.	273614.	62472.	71399.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	4600.0					
TOTAL SATELLITE WEIGHT	8800.0					

VII-96

**** SATELLITE SYSTEMS COST MODEL ****
NCS-1-2 TVBCST-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 40000. ARRAY AREA = 1575.0 SQ FT BATT CAP = 400. AMP-HR

VII-97

SPACECRAFT COST MODEL

NC5-1-2 TV BCST-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	19.4	11.9	31.3	18.6	29.4	48.0
THERMAL CONTROL	3.5	.5	4.0	3.3	1.5	4.8
ELECTRICAL POWER	14.6	3.4	17.9	16.8	26.7	43.6
COMMUNICATIONS	2.1	1.0	3.1	5.0	6.0	11.0
DATA HANDLING	17.3	.7	18.0	43.6	9.9	53.5
STABILITY AND CONTROL	8.3	5.8	14.1	35.0	15.2	50.2
AUXILIARY PROPULSION	2.1	1.3	3.4	3.3	4.3	7.7
SPACECRAFT MISSION EQUIPMENT	67.3	24.6	91.8	125.6	93.0	218.7
			282.5			544.6
SATELLITE QUALIFICATION UNIT(S)			374.3			763.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			4.5			5.0
CONTRACTOR FEE			6.7			15.7
TOTAL SATELLITE			385.5			783.9
AVERAGE UNIT COST (4 SATELLITES)						196.0
TOTAL SATELLITE DDT+E AND RECURRING COST						1169.4

86-1117

NC5-1-2 TV BCST-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	52465.	47673.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	155112.	159828.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	519317.	368229.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	165206.	131789.
1901	CONTROL ELECT.	5	10.3	25.5	2.00	4001851.1	3947828.	1159704.	3277148.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	627363.	1162101.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	138514.	133992.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	72750.	68215.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	368091.	528394.
209	DIGITAL TELEMETRY	4	13.5	14.0	.50	2980749.1	112621.	589372.	2101985.
430	COMMAND DIST UNIT	3	26.0	4.8	.50	6157225.1	191209.	784028.	3776539.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41050.	12506.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	128713.	201169.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.1	84817.	125488.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	199245.	101132.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	267209.	143802.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45503.	21652.
424	RECEIVER	3	5.0	3.0	.25	58864.1	34046.	145008.	72208.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	33728.	8775.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	84458.	19573.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	31248.	27162.

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NC5-1-2 TV BCST-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
275	BATTERY	4	100.0	0.0	.10	269076.	103519.	369777.	484339.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	1100.0	1.00	4028489.	1500773.	3105061.	965669.
WIRING HARNESS	230.0	1.00	825983.	485912.	532425.	197997.
THERMAL CONTROL	180.0	1.00	2039389.	370663.	261552.	488862.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	549602.	289844.
STRUCTURE	1905.0	1.00	8641322.	6668955.	3449474.	2071412.
POWER CONTROL UNITS	270.0	.50	3435901.	339004.	701392.	823620.
SOLAR ARRAY DRIVE	110.0	1.00	2418965.	1592441.	1647360.	579851.
SATELLITE ADAPTER	205.0	1.00	353906.	369939.	72108.	84835.

PROPELLANT WEIGHT 500.0

MISSION EQUIP WEIGHT 6500.0

TOTAL SATELLITE WEIGHT 12100.0

001-1100

SPACECRAFT COST MODEL

NP1-1-2 HEAO-D

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	18.2	3.8	22.0	12.8	7.0	19.8
THERMAL CONTROL	1.6	.4	2.0	1.1	.9	2.1
ELECTRICAL POWER	7.8	2.7	10.5	6.0	10.8	16.8 ✓
COMMUNICATIONS	1.5	.6	2.1	1.8	1.6	3.4
DATA HANDLING	15.0	.9	16.0	23.8	2.8	26.5
STABILITY AND CONTROL	4.2	1.6	5.8	4.4	3.4	7.8
AUXILIARY PROPULSION	2.3	1.3	3.6	2.3	3.2	5.5
SPACECRAFT MISSION EQUIPMENT	50.7	11.3	62.0 11.4	52.2	29.7	81.9 17.8
SATELLITE QUALIFICATION UNIT(S)			73.3 0.0			99.7
GSE (AGE)			3.6			
LAUNCH SITE SUPPORT						2.3
CONTRACTOR FEE			4.6			5.9
TOTAL SATELLITE			81.5			107.9
AVERAGE UNIT COST (3 SATELLITES)						36.0
TOTAL SATELLITE DDT+E AND RECURRING COST						189.4

VII-101

NP1-1-2 HEAD-D

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1322	REACTION WHEEL	1	31.0	10.0	1.00	98701.	39694.	21447.	23153.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	32645.	28313.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	315942.	275122.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	429049.	533024.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	99239.	93676.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41909.	41743.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.40	2432527.	55624.	204263.	1585471.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	408520.	316890.
403	CDU	1	12.3	7.5	.40	5918273.	19128.	39022.	2756107.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	89644.	213237.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	78763.	46846.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	81094.	48488.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

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NP1-1-2 HEAD-0

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	47.5	0.0	.10	61962.	36770.	132719.	115421.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	152.5	1.00	1012410.	240820.	520522.	237492.
WIRING HARNESS	687.8	1.00	2091192.	1230213.	1408224.	490553.
THERMAL CONTROL	126.3	1.00	956246.	291511.	222093.	224317.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	137.6	1.00	1334007.	857673.	617940.	312932.
STRUCTURE	443.6	1.00	9295189.	1932368.	1044181.	2180471.
POWER CONTROL UNITS	124.4	1.00	1418832.	430881.	465665.	332830.
SOLAR ARRAY DRIVE	25.3	1.00	893061.	456596.	493455.	209495.
SATELLITE ADAPTER	320.7	1.00	517703.	360381.	97873.	121443.

PROPELLANT WEIGHT 290.1

MISSION EQUIP WEIGHT 9300.0

TOTAL SATELLITE WEIGHT 11889.0

VII-103

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**** SATELLITE SYSTEMS COST MODEL ****

NP1-1-3 HEAD-E

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 250. NUMBER OF QUAL UNITS = 0
BOL POWER = 2697. ARRAY AREA = 219.0 SQ FT BATT CAP = 66. AMP-HR

✓ 11-104

SPACECRAFT COST MODEL

NP1-1-3 HEAC-E

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	18.2	3.8	22.0	17.5	8.9	26.3
THERMAL CONTROL	1.6	.4	2.0	1.6	1.2	2.8
ELECTRICAL POWER	7.8	2.7	10.5	8.1	13.8	21.9
COMMUNICATIONS	1.5	.6	2.1	2.3	2.0	4.3
DATA HANDLING	15.0	.9	16.0	30.5	3.6	34.1
STABILITY AND CONTROL	4.2	1.6	5.8	5.7	4.3	10.0
AUXILIARY PROPULSION	2.3	1.3	3.6	3.1	4.2	7.2
SPACECRAFT	50.7	11.3	62.0	68.7	37.9	106.7
MISSION EQUIPMENT			11.4			22.1
SATELLITE			73.3			128.8
QUALIFICATION UNIT(S)			0.0			
USE (AGE)			3.6			
LAUNCH SITE SUPPORT						3.1
CONTRACTOR FEE			4.6			7.7
TOTAL SATELLITE			81.5			139.5
AVERAGE UNIT COST (4 SATELLITES)						34.9
TOTAL SATELLITE DOT+E AND RECURRING COST						221.1

NP1-1-3 HEAC-E

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1322	REACTION WHEEL	1	31.0	10.0	1.00	98701.	39694.	20529.	23660.
1601	VALVE IRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	98213.	90519.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.40	2432527.	55624.	202150.	1532048.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	CDU	1	12.3	7.5	.40	5918273.	19128.	38618.	2663239.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	85809.	201169.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	75393.	44195.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	77625.	45744.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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NP1-1-3 HEAO-E

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	47.5	0.0	.10	61962.	36770.	131346.	111532.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	152.5	1.00	1012410.	240820.	498251.	242685.
WIRING HARNESS	687.8	1.00	2091192.	1230213.	1347973.	501280.
THERMAL CONTROL	126.3	1.00	956246.	291511.	212591.	229222.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	137.6	1.00	1334007.	857673.	591501.	319775.
STRUCTURE	443.6	1.00	9295189.	1932368.	999505.	2228151.
POWER CONTROL UNITS	124.4	1.00	1418832.	430881.	445741.	340108.
SOLAR ARRAY DRIVE	25.3	1.00	893061.	456596.	472343.	214076.
SATELLITE ADAPTER	320.7	1.00	517703.	360381.	93686.	124099.
PROPELLANT WEIGHT	290.1					
MISSION EQUIP WEIGHT	9300.0					

TOTAL SATELLITE WEIGHT 11889.0

VII-107

**** SATELLITE SYSTEMS COST MODEL ****

NP1-1-4A VLBI

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - SEPARATE UFLINK AND DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 100000. NUMBER OF QUAL UNITS = 0
BOL POWER = 212. ARRAY AREA = 65.0 SQ FT BATT CAP = 30. AMP-HR

801-11A

SPACECRAFT COST MODEL

NP1-1-4A VLBI

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.8	1.2	5.0	1.5	1.4	3.0
THERMAL CONTROL	1.0	1.4	2.4	.4	.3	.7
ELECTRICAL POWER	2.8	1.4	4.2	1.3	3.0	4.4
COMMUNICATIONS	.7	.7	1.4	.3	.6	.9
DATA HANDLING	6.0	.3	6.2	2.4	.6	3.0
STABILITY AND CONTROL	2.7	.8	3.4	1.2	1.1	2.3
AUXILIARY PROPULSION	1.5	.7	2.2	.8	1.3	2.1
SPACECRAFT	18.5	6.4	24.9	8.0	8.3	16.3
MISSION EQUIPMENT			4.0			3.8
SATELLITE			28.9			20.0
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.7			
LAUNCH SITE SUPPORT						.7
CONTRACTOR FEE			1.9			1.2
... TOTAL SATELLITE			32.4			22.0
... AVERAGE UNIT COST (2 SATELLITES)						11.0
TOTAL SATELLITE DDT+E AND RECURRING COST						54.4

601-109

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NP1-1-4A VLBI

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
803	EARTH SENSOR	2	1.3	0.0	1.00	142702.	55025.	73298.	68414.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45752.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	823441.	139061.	159823.	164518.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2696267.	47819.	54958.	538695.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
206	ANTENNA	1	1.5	0.0	1.00	130270.	174226.	33296.	26027.
227	ANTENNA	1	.8	0.0	1.00	74525.	110290.	20284.	14890.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	168631.	69808.	27344.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.

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NP1-1-4A VL8I

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	30.4	0.0	.10	32 587.	26634.	97235.	63042.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.1	1.00	43 2598.	56886.	130774.	86430.
WIRING HARNESS	65.8	1.00	28 5813.	168139.	204704.	57103.
THERMAL CONTROL	25.4	1.00	60 3593.	982610.	92429.	120594.
POWER CONVERTERS	15.9	1.00	59 0016.	367568.	211246.	117881.
PROPULSION FEED SYS	64.9	1.00	85 3333.	482665.	369859.	170490.
STRUCTURE	162.3	1.00	20 96761.	822087.	472465.	418918.
POWER CONTROL UNITS	97.2	1.00	32 0459.	372969.	428701.	64025.
SATELLITE ADAPTER	55.4	1.00	11 6380....	49488.	37266.	23252.

PROPELLANT WEIGHT 68.0

MISSION EQUIP WEIGHT 750.0

TOTAL SATELLITE WEIGHT 1454.9

**** SATELLITE SYSTEMS COST MODEL ****

NPI-1-AB VLB1-B

SUBSYSTEM CONFIGURATIONS

**STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL**

**AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT**

**DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)**

**COMMUNICATIONS
CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK**

**ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY**

**VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL**

MISCELLANEOUS INFORMATION

**APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 375. ARRAY AREA = 116.0 SQ FT BATT CAP = 24. AMP-HR**

11-112

SPACECRAFT COST MODEL

NP1-1-4B VLBI-B

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.8	1.9	5.7	1.5	2.3	3.8
THERMAL CONTROL	.9	.2	1.0	.3	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.5
COMMUNICATIONS	.7	.2	.9	.3	.5	.8
DATA HANDLING	5.8	.3	6.1	2.3	.6	2.9
STABILITY AND CONTROL	3.0	.8	3.8	1.2	1.2	2.4
AUXILIARY PROPULSION	1.5	.7	2.2	.7	1.1	1.8
SPACECRAFT	19.1	5.4	24.5	7.9	9.0	16.9
MISSION EQUIPMENT			4.0			3.8
SATELLITE			28.5			20.7
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.8			
LAUNCH SITE SUPPORT						1.7
CONTRACTOR FEE			1.8			1.2
TOTAL SATELLITE			32.1			22.7
AVERAGE UNIT COST (2 SATELLITES)						11.3
TOTAL SATELLITE DDT+E AND RECURRING COST						54.7

NP1-1-4B VLBI-B

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUITATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	1	.7	.1	.10	10283.	14762.	13083.	10893.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	797174.	139061.	159823.	159270.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2618784.	47819.	54958.	523214.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
206	ANTENNA	1	1.5	0.0	1.00	86846.	43556.	19978.	17351.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	2170.	9926.
342	TRANSMITTER	1	3.0	70.0	1.00	177223.	37296.	6800.	35408.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	5975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	7476.	9662.

NP1-1-4B VLBI-B

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	85293.	52559.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	57.0	1.00	648883.	96811.	222555.	129642.
WIRING HARNESS	65.0	1.00	282863.	166404.	202591.	56514.
THERMAL CONTROL	35.2	1.00	504913.	122591.	111868.	100878.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	65.6	1.00	899590.	486643.	372907.	179732.
STRUCTURE	284.5	1.00	2081683.	1324698.	761322.	415906.
POWER CONTROL UNITS	62.4	1.00	447377.	287787.	330790.	89383.
SATELLITE ADAPTER	65.6	1.00	134358.	53107.	41139.	26844.
PROPELLANT WEIGHT	72.8					
MISSION EQUIP WEIGHT	750.0					

TOTAL SATELLITE WEIGHT 1574.2

NP1-1-4B

NL1-1-6 SO/T LNDR

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	I.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	525.0	1.00	4649079.	14123328.	9017745.	0.
WIRING HARNESS	381.9	1.00	1269753.	746974.	1010461.	0.
THERMAL CONTROL	65.5	1.00	844268.	186774.	178747.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	69.7	1.00	876678.	509744.	434009.	0.
STRUCTURE	806.3	1.00	3226447.	3211214.	2050583.	0.
SATELLITE ADAPTER	178.1	1.00	314023.	105859.	81989.	0.
PROPELLANT WEIGHT	164.2					
MISSION EQUIP WEIGHT	1000.0					

TOTAL SATELLITE WEIGHT 3320.6

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SPACECRAFT COST MODEL

NP1-1-5 GW DTCTR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	.7	3.4	1.9	1.6	3.4
THERMAL CONTROL	.4	.1	.5	.3	.3	.6
ELECTRICAL POWER	1.8	.5	2.3	1.4	2.2	3.7
COMMUNICATIONS	.7	.3	1.0	.6	.9	1.6
DATA HANDLING	3.2	.3	3.4	2.7	1.4	4.1
STABILITY AND CONTROL	4.0	1.1	5.1	2.8	2.5	5.4
AUXILIARY PROPULSION	.9	.5	1.4	1.1	1.3	2.4
SPACECRAFT MISSION EQUIPMENT	13.7	3.5	17.2 21.6	10.9	10.3	21.2 26.8
SATELLITE QUALIFICATION UNIT(S)			38.8 0.0			47.9
GSE (AGE)			1.4			
LAUNCH SITE SUPPORT						1.0
CONTRACTOR FEE			1.3			1.5
TOTAL SATELLITE			41.5			50.5
AVERAGE UNIT COST (3 SATELLITES)						16.8
TOTAL SATELLITE DDT+E AND RECURRING COST						92.0

NP1-1-5 GW DTCTR

* * * * ASSEMBLY DESCRIPTIONS * * * *

.. STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	21878.	23497.
1601	VALVE DRIVER ASSY	1	1.6	1.0	1.00	55145.	30236.	18136.	12936.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	315942.	275122.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	238360.	243532.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	75994.	72844.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23283.	26809.

.. DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	445897.	139061.	270487.	205786.
403	CDU	1	12.3	7.5	1.00	1410976.	47819.	51673.	330988.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	13732.	25509.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	43757.	21404.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	45052.	22154.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

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NP1-1-5 GW TCCTR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213	BATTERY	2	13.5	0.0	.10	21490.	14824.	53505.	40032.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.4	1.00	344758.	57379.	124021.	80874.
WIRING HARNESS	24.2	1.00	122377.	71993.	82410.	28707.
THERMAL CONTROL	21.6	1.00	226613.	88037.	79044.	53159.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	32.0	1.00	524420.	281008.	202462.	123019.
STRUCTURE	67.4	1.00	1202235.	389500.	210472.	282021.
POWER CONTROL UNITS	47.8	1.00	573305.	246237.	266115.	134486.
SOLAR ARRAY DRIVE	5.4	1.00	313421.	122861.	132779.	73523.
SATELLITE ADAPTER	23.6	1.00	37565.	22746.	21269.	8812.

PROPELLANT WEIGHT 27.3

MISSION EQUIP WEIGHT 250.0

TOTAL SATELLITE WEIGHT 635.7

611-11A

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**** SATELLITE SYSTEMS COST MODEL ****

NPI-1-6 GP B/C

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 280.1 NUMBER OF QUAL UNITS = 0
BOL POWER = 346.4 ARRAY AREA = 114.0 SQ FT BATT CAP = 8. AMP-HR

VII-120

SPACECRAFT COST MODEL

NP1-1-6 GP B/C

(MILLIONS OF 1977 DOLLARS)

711-121

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.9	5.6	1.5	2.2	3.7
THERMAL CONTROL	.4	.2	.6	.2	.3	.5
ELECTRICAL POWER	3.3	1.2	4.5	1.4	2.6	4.0
COMMUNICATIONS	.6	.2	.8	.2	.5	.7
DATA HANDLING	5.9	.3	6.1	2.3	.6	3.0
STABILITY AND CONTROL	3.0	.8	3.8	1.2	1.2	2.4
AUXILIARY PROPULSION	1.3	.7	2.0	.8	1.2	1.9
SPACECRAFT	18.3	5.1	23.4	7.6	8.6	16.2
MISSION EQUIPMENT			35.5			33.7
SATELLITE			58.9			49.9
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.7			
LAUNCH SITE SUPPORT			1.8			.7
CONTRACTOR FEE						1.2
TOTAL SATELLITE			62.4			51.8
AVERAGE UNIT COST (2 SATELLITE)						25.9
TOTAL SATELLITE DDT+E AND RECURRING COST						114.2

NP1-1-6 GP B/C

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	805967.	139061.	159823.	161027.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2644751.	47819.	54958.	528403.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	8114.	9926.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	46538.	18230.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	20820.	3619.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

V11-122

NP1-1-6 GP B/C

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39220.	21468.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.8	1.00	641031.	94922.	218213.	128073.
WIRING HARNESS	62.0	1.00	271753.	159868.	194634.	54294.
THERMAL CONTROL	32.8	1.00	248365.	116860.	107341.	49622.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	56.2	1.00	777696.	432342.	331297.	155378.
STRUCTURE	275.3	1.00	2068866.	1288197.	740345.	413345.
POWER CONTROL UNITS	43.7	1.00	426801.	233652.	268566.	85272.
SATELLITE ADAPTER	65.7	1.00	134533.	52435.	41175.	26879.
PROPELLANT WEIGHT	48.6					
MISSION EQUIP WEIGHT	830.0					

TOTAL SATELLITE WEIGHT 1554.0

VII-123

**** SATELLITE SYSTEMS COST MODEL ****

NP1-1-7 ADV REL X

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 280. NUMBER OF QUAL UNITS = 0
BOL POWER = 346. ARRAY AREA = 114.0 SQ FT BATT CAP = 8. AMP-HR

VII-124

SPACECRAFT COST MODEL

NPI-1-7 ADV REL X

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.9	5.6	1.5	2.2	3.7
THERMAL CONTROL	.4	.2	.6	.2	.3	.5
ELECTRICAL POWER	2.4	.8	3.3	1.0	1.6	2.7
COMMUNICATIONS	.6	.2	.8	.2	.5	.7
DATA HANDLING	5.9	.3	6.1	2.3	.6	3.0
STABILITY AND CONTROL	3.0	.8	3.8	1.2	1.2	2.4
AUXILIARY PROPULSION	1.3	.7	2.0	.8	1.2	1.9
SPACECRAFT MISSION EQUIPMENT	17.4	4.8	22.2 35.5	7.3	7.6	14.9 33.7
SATELLITE QUALIFICATION UNIT(S)			57.7 0.0			48.6
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT						.7
CONTRACTOR FEE			1.7			1.1
TOTAL SATELLITE			61.0			50.3
AVERAGE UNIT COST (2 SATELLITES)						25.2
TOTAL SATELLITE DDT+E AND RECURRING COST						111.4

VII-12.5

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* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	805967.	139061.	159823.	161027.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2644751.	47819.	54958.	528403.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	8114.	9926.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	46538.	18230.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	20820.	3619.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-126

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39220.	21468.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.8	1.00	129152.	40227.	92477.	25804.
WIRING HARNESS	62.0	1.00	271753.	159868.	194634.	54294.
THERMAL CONTROL	32.8	1.00	248365.	116860.	107341.	49622.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	56.2	1.00	777696.	432342.	331297.	155378.
STRUCTURE	275.3	1.00	2068866.	1288197.	740345.	413345.
POWER CONTROL UNITS	43.7	1.00	426801.	32044.	36832.	85272.
SATELLITE ADAPTER	65.7	1.00	134533.	52435.	41175.	26879.
PROPELLANT WEIGHT	48.6					
MISSION EQUIP WEIGHT	830.0					

TOTAL SATELLITE WEIGHT 1554.0

VII-127

**** SATELLITE SYSTEMS COST MODEL ****
NPL-8 EXPLORER

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 0. NUMBER OF QUAL UNITS = 0

BOL POWER = 183. ARRAY AREA = 42.0 SQ FT BATT CAP = 6. AMP-HR

VII-128

SPACECRAFT COST MODEL

NP1-1-8 EXPLORER

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.0	.6	2.6	.8	.7	1.5
THERMAL CONTROL	.4	.1	.5	.2	.2	.4
ELECTRICAL POWER	2.3	.9	3.2	1.0	1.9	2.8
COMMUNICATIONS	1.2	.4	1.5	.5	.6	1.1
DATA HANDLING	2.8	.3	3.0	1.1	.6	1.7
STABILITY AND CONTROL	1.2	.2	1.4	.5	.5	1.0
AUXILIARY PROPULSION	1.3	.7	2.0	.8	1.2	1.9
SPACECRAFT MISSION EQUIPMENT	11.2	3.1	14.3	4.8	5.6	10.4
			2.3			2.2
SATELLITE QUALIFICATION UNIT(S)			16.6			12.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE			1.1			.6
						.8
TOTAL SATELLITE			18.9			13.9
AVERAGE UNIT COST (2 SATELLITES)						6.9
TOTAL SATELLITE DDT+E AND RECURRING COST						32.8

VII-129

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NP1-1-8 EXPLORER

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
503	GIMBAL ELECTRONICS	1	6.3	31.6	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	359982.	139061.	159823.	71922.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1281027.	47819.	54958.	255940.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	52968.	82978.
309	TRANSMITTER	1	1.8	8.8	1.00	81652.	24908.	42405.	16313.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	20820.	3619.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

711-130

NP1-1-8 EXPLORER

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	1	19.0	0.0	.10	8778.	11541.	42134.	14081.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	20.6	1.00	318655.	37725.	86724.	63665.
WIRING HARNESS	25.6	1.00	128355.	75509.	91930.	25644.
THERMAL CONTROL	19.2	1.00	223898.	81280.	78471.	44733.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	56.2	1.00	777696.	432342.	331297.	155378.
STRUCTURE	71.9	1.00	1128728.	411497.	236493.	225512.
POWER CONTROL UNITS	31.1	1.00	294035.	191493.	220107.	58746.
SATELLITE ADAPTER	21.9	1.00	35252.	21209.	21653.	7043.

PROPELLANT WEIGHT 48.6

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 590.1

NP1-1-31

**** SATELLITE SYSTEMS COST MODEL ****

NP2-1-1 SMM

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 310. NUMBER OF QUAL UNITS = 0

BOL POWER = 944. ARRAY AREA = 76.7 SQ FT BATT CAP = 24. AMP-HR

V11-132

SPACECRAFT COST MODEL

NP2-1-1 SMM

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.5	1.3	6.8	8.7	5.2	13.9
THERMAL CONTROL	.6	.1	.7	.9	.8	1.8
ELECTRICAL POWER	2.7	.8	3.5	4.8	6.8	11.6
COMMUNICATIONS	1.5	.6	2.1	3.5	3.2	6.7
DATA HANDLING	8.2	.3	8.4	15.0	2.8	17.8
STABILITY AND CONTROL	4.3	1.6	5.9	8.9	7.1	16.0
AUXILIARY PROPULSION	1.4	.8	2.1	3.5	4.3	7.8
SPACECRAFT MISSION EQUIPMENT	4.2	5.4	29.6 4.9	45.3	30.3	75.6 16.6
SATELLITE QUALIFICATION UNIT(S)			34.5 0.0			92.2
GSE (AGE)			2.1			3.1
LAUNCH SITE SUPPORT			2.2			5.5
CONTRACTOR FEE						
TOTAL SATELLITE			38.8			100.9
AVERAGE UNIT COST (7 SATELLITES)						14.4
TOTAL SATELLITE DDT+E AND RECURRING COST						139.7

NP2-1-1 SMM

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1309	REACTION WHEEL	1	8.5	1.1	1.00	148118.1	59540.	29611.	33213.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.1	51402.	28700.	22755.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.1	295104.	277763.	262988.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.1	749743.	377202.	428395.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15058.1	62143.	95624.	82949.
834	THRUSTER	4	.7	.1	.10	11440.1	25095.	40382.	36963.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1244717.1	139061.	237801.	461689.
403	CDU	1	12.3	7.5	1.00	3552289.1	47819.	45429.	796546.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.1	16117.	26827.	10006.
203	ANTENNA	2	0.4	0.0	1.00	462041.1	268784.	78812.	171380.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.1	47779.	69245.	37651.
312	TRANSMITTER	2	2.2	15.8	1.00	105053.1	49590.	71295.	38970.
401	RECEIVER	1	3.9	6.3	1.00	77256.1	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	30978.	7475.
503	DIPLEXER	1	3.1	1.0	1.00	57409.1	15451.	16324.	12873.

VII-134

NP2-1-1 SMM

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	19.8	0.0	.10	27169.1	19583.	68108.	44814.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	53.4	1.00	485733.	91136.	173182.	108919.
WIRING HARNESS	77.3	1.00	327544.	192747.	193976.	73469.
THERMAL CONTROL	29.0	1.00	350709.	107500.	82563.	78641.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	62.1	1.00	788219.	466653.	295587.	176746.
STRUCTURE	124.9	1.00	2676793.	657999.	312592.	600230.
POWER CONTROL UNITS	54.7	1.00	767758.	266447.	253159.	172158.
SOLAR ARRAY DRIVE	8.9	1.00	439797.	187872.	178503.	98618.
SATELLITE ADAPTER	72.4	1.00	146103.	65920.	36026.	32762.

PROPELLANT WEIGHT 85.9

MISSION EQUIP WEIGHT 1250.0

TOTAL SATELLITE WEIGHT 1971.0.

Y11-135

(19)

**** SATELLITE SYSTEMS COST MODEL ****

NP2-1-2 DESQ

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 1900. NUMBER OF QUAL UNITS = 0
BOL POWER = 183. ARRAY AREA = 41.9 SQ FT BATT CAP = 6. AMP-HR

VII-136

SPACECRAFT COST MODEL

NP2-1-2 OES0

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	1.1	4.4	0.0	.8	.8
THERMAL CONTROL	.5	.1	.7	0.0	.1	.1
ELECTRICAL POWER	2.4	1.1	3.6	0.0	1.4	1.4
COMMUNICATIONS	.5	.2	.7	0.0	.2	.2
DATA HANDLING	5.1	.3	5.4	0.0	.3	.3
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6
AUXILIARY PROPULSION	1.5	.7	2.2	.1	.7	.8
SPACECRAFT MISSION EQUIPMENT	16.0	4.3	20.4 3.8	.2	4.1	4.3 2.0
SATELLITE QUALIFICATION UNIT(S)			24.1			6.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.5			.3 .3
TOTAL SATELLITE			27.2			7.0
AVERAGE UNIT COST (1 SATELLITES)						7.0
TOTAL SATELLITE DDT+E AND RECURRING COST						34.2

V11-137

NP2-1-2 JESO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	692260.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2306643.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
206	ANTENNA	1	1.5	0.0	1.00	86846.	43556.	14798.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
398	TRANSMITTER	1	2.1	16.0	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	5.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.

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ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.1	0.0	.10	8778.	28995.	107202.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	33.4	1.00	318123.	59017.	150745.	0.
WIRING HARNESS	48.6	1.00	221052.	130041.	175911.	0.
THERMAL CONTROL	25.7	1.00	304259.	99046.	103406.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	64.9	1.00	853333.	482665.	410954.	0.
STRUCTURE	154.7	1.00	1834019.	789249.	503990.	0.
POWER CONTROL UNITS	48.2	1.00	294035.	247440.	316015.	0.
SATELLITE ADAPTER	47.3	1.00	101749.	41827.	37750.	0.
PROPELLANT WEIGHT	56.1					
MISSION EQUIP WEIGHT	600.0					

TOTAL SATELLITE WEIGHT 1217.5

V11-139

1174

**** SATELLITE SYSTEMS COST MODEL ****
NPC-1-3 EXPLR DC

SUBSYSTEM CONFIGURATIONS .

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 0. NUMBER OF QUAL UNITS = 0
BOL POWER = 307. ARRAY AREA = 100.8 SQ FT BATT CAP = 6. AMP-HR

VII-140

SPACECRAFT COST MODEL

NP2-1-3 EXPLR DC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.1	1.3	3.3	8.6	14.5	23.3
THERMAL CONTROL	.4	.1	.5	1.6	2.7	4.3
ELECTRICAL POWER	3.0	1.1	4.0	12.7	22.7	35.4
COMMUNICATIONS	.7	.2	1.0	3.3	6.0	9.2
DATA HANDLING	3.0	.3	3.2	13.6	9.4	23.0
STABILITY AND CONTROL	3.0	.8	3.8	12.5	11.6	24.2
AUXILIARY PROPULSION	1.3	.6	1.9	7.4	11.4	18.8
SPACECRAFT MISSION EQUIPMENT	13.5	4.4	17.9 2.0	59.7	78.4	138.1 15.7
SATELLITE QUALIFICATION UNIT(S)			19.9 0.0			153.8
GSE (AGE)			1.4			
LAUNCH SITE SUPPORT						9.6
CONTRACTOR FEE			1.3			10.3
TOTAL SATELLITE			22.6			173.8
AVERAGE UNIT COST (29 SATELLITES)						6.0
TOTAL SATELLITE DDT+E AND RECURRING COST						196.4

NP2-1-3 EXPLR DC

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	15395.	23559.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	11113.	16501.
403	NOTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	10196.	10975.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	173936.	152237.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	72083.	50752.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	65040.	43529.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	415325.	139061.	191595.	88303.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1323660.	47819.	36602.	188047.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	21615.	6339.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	9727.	11752.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	30994.	12962.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	31912.	13417.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	23960.	10975.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	13866.	2574.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	13152.	8156.

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ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	11541.	35915.	10133.

EQUIPHMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	49.5	1.00	588123.	84955.	130069.	83552.
WIRING HARNESS	33.0	1.00	159194.	93651.	75935.	22616.
THERMAL CONTROL	27.9	1.00	230580.	104719.	65033.	32758.
POWER CONVERTERS	15.9	1.00	590016.	367568.	140689.	83821.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	210956.	106341.
STRUCTURE	176.2	1.00	1182857.	881560.	337424.	168044.
POWER CONTROL UNITS	39.5	1.00	397962.	220240.	169597.	56537.
SATELLITE ADAPTER	32.1	1.00	48790.	26081.	18036.	6931.
PROPELLANT WEIGHT	36.4					
MISSION EQUIP WEIGHT	195.0					

TOTAL SATELLITE WEIGHT 740.1

V11-143

0/98

SPACECRAFT COST MODEL

NP2-1-4 EXPLR SC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.9	.9	2.8	8.0	10.1	18.1
THERMAL CONTROL	.8	.1	.9	3.2	2.4	5.6
ELECTRICAL POWER	2.6	1.2	3.8	11.1	24.5	35.7
COMMUNICATIONS	1.2	.4	1.5	4.9	6.0	10.9
DATA HANDLING	2.7	.3	2.9	11.1	5.9	17.0
STABILITY AND CONTROL	2.7	.7	3.4	10.9	9.8	20.7
AUXILIARY PROPULSION	1.3	.6	1.9	7.4	11.4	18.8
SPACECRAFT MISSION EQUIPMENT	13.1	4.2	17.3 1.9	56.6	70.1	126.7 12.8
SATELLITE QUALIFICATION UNIT(S)			19.1 0.0			139.5
GSE (AGE)			1.3			9.1
LAUNCH SITE SUPPORT						9.5
CONTRACTOR FEE			1.3			
TOTAL SATELLITE			21.8			158.2
AVERAGE UNIT COST (29 SATELLITES)						5.5
TOTAL SATELLITE DDT+E AND RECURRING COST						179.9

2.17m

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	15395.	23559.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	11113.	16501.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	10196.	10975.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	173936.	152237.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	27120.	18223.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	65040.	43529.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	346043.	139061.	106442.	49161.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1236329.	47819.	36602.	175640.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	52915.	59003.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	8105.	7058.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	28105.	46492.	19444.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	23960.	10975.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	13866.	2574.

571-11A

NP2-1-4 EXPLR SC

ELECTRICAL POWER

IDENT	TYPE	VO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	11541.	35915.	10133.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.7	1.00	439563.	57870.	88601.	62447.
WIRING HARNESS	34.5	1.00	165309.	97248.	78852.	23485.
THERMAL CONTROL	23.4	1.00	455413.	92946.	58674.	64699.
POWER CONVERTERS	15.9	1.00	590016.	367568.	140689.	83821.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	210966.	106341.
STRUCTURE	112.9	1.00	1098310.	603861.	231132.	156033.
POWER CONTROL UNITS	78.5	1.00	323104.	329144.	251965.	45902.
SATELLITE ADAPTER	24.0	1.00	38105.	21959.	15214.	5413.
PROPELLANT WEIGHT	36.4					
MISSION EQUIP WEIGHT	120.0					

TOTAL SATELLITE WEIGHT 613.6

971-111

**** SATELLITE SYSTEMS COST MODEL ****

NPL-1-5 SQ #BSRYTRY

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

---APOGEE = 190. NUMBER OF QUAL UNITS = 0
BOL POWER = 2680. ARRAY AREA = 217.6 SQ FT. BATT CAP = 66. AMP-HR

✓ 11-147

03

704

SPACECRAFT COST MODEL

NP2-1-5 SO OBSRVTRY

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	22.9	7.5	30.3	0.0	5.0	5.0
THERMAL CONTROL	3.1	.4	3.5	0.0	.4	.4
ELECTRICAL POWER	11.1	4.3	15.4	.2	6.2	6.4
COMMUNICATIONS	1.5	.7	2.2	.6	.8	1.4
DATA HANDLING	18.1	.2	18.3	14.5	.9	15.4
STABILITY AND CONTROL	6.3	2.2	8.5	2.6	2.5	5.0
AUXILIARY PROPULSION	6.3	4.3	10.7	.1	3.9	4.0
SPACECRAFT MISSION EQUIPMENT	69.3	19.6	88.8 12.4	18.0	19.6	37.7 7.7
SATELLITE QUALIFICATION UNIT(S)			101.2 3.0			45.4 .
GSE (AGE)			4.5			1.1
LAUNCH SITE SUPPORT						2.7
CONTRACTOR FEE			5.5			
TOTAL SATELLITE			112.3			49.1
AVERAGE UNIT COST (1 SATELLITES)						49.1
TOTAL SATELLITE DDT+E AND RECURRING COST						161.4

NP2-1-5 SO OBSRVTRY

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	2	10.0	4.0	1.00	1500956.	851188.	644803.	599765.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	990295.	172894.	397414.	355749.
1803	EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	642353.	497386.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	.40	3574179.	55624.	376624.	3532145.
406	COMM DECOD+DISTR	2	11.0	5.5	.40	7088524.	73633.	276976.	5005166.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UN11	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	105936.	184625.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	93077.	40561.
312	TRANSMITTER	2	2.2	15.8	1.00	105053.	49590.	95833.	41982.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	39496.	25521.

NP2-1-5 SO OBSRVTRY

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	47.5	0.0	.10	61952.1	36770.	135950.	125039.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	151.5	1.00	1007875.	239358.	611386.	0.
WIRING HARNESS	1311.5	1.00	3614875.	2126570.	2876695.	0.
THERMAL CONTROL	134.1	1.00	1809175.	303599.	271821.	0.
POWER CONVERTERS	10.0	1.00	410935.	256004.	163477.	0.
PROPULSION FEED SYS	736.5	1.00	3708843.	3095037.	2635195.	0.
STRUCTURE	1176.5	1.00	11963317.	4427734.	2827417.	0.
POWER CONTROL UNITS	143.5	1.00	1413593.	468431.	598252.	0.
SOLAR ARRAY DRIVE	25.2	1.00	890665.	455061.	581177.	0.
SATELLITE ADAPTER	372.3	1.00	587700.	526583.	126209.	0.

PROPELLANT WEIGHT 2445.0

MISSION EQUIP WEIGHT 10900.0

TOTAL SATELLITE WEIGHT 17689.9

0151-117

**** SATELLITE SYSTEMS COST MODEL ****

NP3-1-1 BESS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 300. NUMBER OF QUAL UNITS = 0
BOL POWER = 1122. ARRAY AREA = 91.0 SQ FT BATT CAP = 30. AMP-HR

VII-151

8-1

207

SPACECRAFT COST MODEL

NP3-1-1 BESS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.8	1.5	9.3	9.2	4.6	13.8
THERMAL CONTROL	.6	.2	.8	.8	.7	1.4
ELECTRICAL POWER	3.3	1.0	4.3	4.3	6.3	10.6
COMMUNICATIONS	.7	.2	1.0	.9	1.3	2.2
DATA HANDLING	9.0	.2	9.2	12.4	1.7	14.1
STABILITY AND CONTROL	4.2	1.2	5.4	4.9	4.1	9.0
AUXILIARY PROPULSION	1.4	.7	2.1	2.5	2.2	4.7
SPACECRAFT MISSION EQUIPMENT	27.0	4.9	31.9	35.0	21.6	56.6
			100.6			251.5
SATELLITE QUALIFICATION UNIT(S)			132.5			308.1
GSE (AGE)			3.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE			2.4			2.3
						4.1
TOTAL SATELLITE			137.1			314.5
AVERAGE UNIT COST (5 SATELLITES)						62.9
TOTAL SATELLITE DDT+E AND RECURRING COST						451.7

208

NP3-1-1 BESS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1315	REACTION WHEEL	1	12.2	12.0	1.00	195271.1	78588.	42352.	46191.
1601	VALVE DRIVER ASSY	1	1.6	1.0	1.00	55145.1	30236.	16781.	13044.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	292339.	277428.
2203	CONTROL ELECTRONCS	1	7.1	62.0	1.00	1038151.1	441025.	220553.	245573.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15058.1	62143.	97278.	87722.
834	THRUSTER	2	.7	.1	.10	10283.1	14762.	22823.	25105.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.70	1423617.1	97343.	200225.	496518.
403	CDU	1	12.3	7.5	.70	3867072.1	33473.	38251.	963662.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.1	16117.	28235.	10555.
227	ANTENNA	1	.8	0.0	1.00	49684.1	27572.	7059.	11732.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.1	28105.	40488.	21583.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.1	29171.	41687.	22339.
401	RECEIVER	1	3.9	6.3	1.00	77256.1	24775.	31298.	18275.
503	COMMAND SIG COND	1	1.5	.9	1.00	18113.1	18113.	18113.	14285.
603	DIPLEXER	1	3.1	1.0	1.00	57409.1	15451.	17181.	13580.

NP3-1-1 BESS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
227	BATTERY	2	23.8	0.0	.10	32587.	22357.	79100.	56845.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.4	1.00	547483.	106837.	213671.	129506.
WIRING HARNESS	126.4	1.00	497173.	292478.	307788.	117604.
THERMAL CONTROL	34.1	1.00	373552.	119981.	95533.	88362.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	59.5	1.00	777480.	451631.	301084.	183910.
STRUCTURE	148.0	1.00	3859184.	760098.	380044.	912876.
POWER CONTRL UNIT	61.3	1.00	849393.	284808.	284804.	200922.
SOLAR ARRAY DRIVE	10.3	1.00	491962.	216217.	216215.	116372.
SATELLITE ADAPTER	117.9	1.00	221149.	107375.	50432.	52312.

PROPELLANT WEIGHT 56.9

MISSION EQUIP WEIGHT 2500.0

TOTAL SATELLITE WEIGHT 3308.3

VII-154

**** SATELLITE SYSTEMS COST MODEL ****

NP3-1-2 VFR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPELLSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 300. NUMBER OF QUAL UNITS = 0

BOL POWER = 1122. ARRAY AREA = 91.0 SQ FT BATT CAP = 30. AMP-HR

VII-155

SPACECRAFT COST MODEL

NP3-1-2 VFR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.8	1.5	9.3	16.0	8.3	24.2
THERMAL CONTROL	.6	.2	.8	1.3	1.2	2.5
ELECTRICAL POWER	3.3	1.0	4.3	7.5	11.4	18.9
COMMUNICATIONS	.7	.2	1.0	1.5	2.4	3.9
DATA HANDLING	9.0	.2	9.2	21.9	3.3	25.1
STABILITY AND CONTROL	4.2	1.2	5.4	8.6	7.3	15.9
AUXILIARY PROPULSION	1.4	.7	2.1	4.4	5.5	9.9
SPACECRAFT MISSION EQUIPMENT	27.0	4.9	31.9 100.6	61.1	39.3	100.4 642.3
SATELLITE QUALIFICATION UNIT(S)			132.5			742.7
GSE (AGE)			0.0 2.3			
LAUNCH SITE SUPPORT						4.7
CONTRACTOR FEE			2.4			7.4
TOTAL SATELLITE			137.1			754.8
AVERAGE UNIT COST (10 SATELLITES)						75.5
TOTAL SATELLITE DDT+E AND RECURRING COST						891.9

951-116

NP3-1-2 VFR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1315	REACTION WHEEL	1	12.2	12.0	1.00	195271.	78588.	38117.	40127.
1601	VALVE DRIVER ASSY	1	1.6	1.0	1.00	55145.	30236.	15103.	11332.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	263105.	241006.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	198498.	213334.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	93546.	77247.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	21947.	22107.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.70	1423617.	97343.	192543.	437229.
403	CDU	1	12.3	7.5	.70	3867072.	33473.	36783.	848590.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	25412.	9169.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	6353.	10210.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	36439.	18750.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	37518.	19406.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	28168.	15875.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	16302.	3723.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15463.	11797.

NP3-1-2 VFR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	23.8	0.0	.10	32587.	22357.	76066.	50057.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.4	1.00	547488.	106837.	192304.	112504.
WIRING HARNESS	126.4	1.00	497173.	292478.	278810.	102165.
THERMAL CONTROL	34.1	1.00	373552.	119981.	85980.	76762.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	59.5	1.00	777480.	451631.	270976.	159766.
STRUCTURE	148.0	1.00	3859184.	760098.	342041.	793032.
POWER CONTROL UNITS	61.3	1.00	849398.	284808.	256325.	174545.
SOLAR ARRAY DRIVE	10.5	1.00	491962.	216217.	194594.	101094.
SATELLITE ADAPTER	117.9	1.00	221148.	107375.	45389.	45444.

PROPELLANT HEIGHT 56.9

MISSION EQUIP HEIGHT 2500.0

TOTAL SATELLITE HEIGHT 3308.3

7/11-15-8

**** SATELLITE SYSTEMS COST MODEL ****
NLI-HI JOP PROBE

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS PASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - NUCLEAR POWER GENERATION

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE * 5000. NUMBER OF QUAL UNITS = 0

651-11A

SPACECRAFT COST MODEL

NL1-1-1 JUP PROBE

(MILLIONS OF 1977 DOLLARS)

VII-160

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.7	3.8	10.5	2.7	4.5	7.2
THERMAL CONTROL	1.3	.2	1.5	.5	.3	.8
ELECTRICAL POWER	6.9	11.6	18.4	2.8	15.0	17.8
COMMUNICATIONS	.5	.3	.8	.6	.7	1.2
DATA HANDLING	5.8	.4	6.3	5.6	1.9	7.5
STABILITY AND CONTROL	6.3	2.2	8.5	6.1	4.4	10.5
AUXILIARY PROPULSION	4.9	3.1	8.0	2.2	5.0	7.3
SPACECRAFT	32.4	21.6	54.0	20.4	31.9	52.3
MISSION EQUIPMENT			14.4			11.3
SATELLITE			68.4			63.6
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT						1.4
CONTRACTOR FEE			4.0			3.8
TOTAL SATELLITE			75.0			68.7
AVERAGE UNIT COST (2 SATELLITES)						34.4
TOTAL SATELLITE DDT+E AND RECURRING COST						143.7

NL1-1-1 JUP PROBE

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
15C1	CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851188.	580324.	719594.
16C1	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	357673.	426826.
18C3	EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	578119.	596760.

ALXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55765.	54496.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23550.	27842.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	865786.	139061.	287682.	415075.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	2562757.	184082.	380820.	1228638.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.

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NL1-1-1 JUP PROBE

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	175.0	1.00	2818729.	7636141.	4388118.	563162.
WIRING HARNESS	227.9	1.00	819583.	482147.	586998.	163747.
THERMAL CONTROL	37.5	1.00	763778.	127967.	116088.	152597.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PROPULSION FEED SYS	474.5	1.00	2862205.	2211054.	1694298.	571848.
STRUCTURE	642.4	1.00	3710755.	2647169.	1521365.	741383.
SATELLITE ADAPTER	125.1	1.00	232576.	117576.	60015.	46467.
PROPELLANT WEIGHT	1632.8					
MISSION EQUIP WEIGHT	185.0					

TOTAL SATELLITE WEIGHT 3638.9

VII-162

**** SATELLITE SYSTEMS COST MODEL ****
NLI-1-2 VDIR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 5000. NUMBER OF QUAL UNITS = 0
BOL POWER = 1433. ARRAY AREA = 116.3 SQ FT BATT CAP = 72. AMP-HR

VII-163

SPACECRAFT COST MODEL

NL1-1-2 VOIR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	13.7	6.9	20.7	5.5	8.4	13.9
THERMAL CONTROL	3.1	.2	3.3	1.2	.4	1.7
ELECTRICAL POWER	6.6	2.7	9.3	3.0	6.9	9.9
COMMUNICATIONS	1.4	.7	2.1	1.5	1.3	2.9
DATA HANDLING	11.7	.4	12.1	11.2	1.9	13.1
STABILITY AND CONTROL	6.3	2.2	8.5	6.1	4.4	10.5
AUXILIARY PROPULSION	8.4	6.3	14.7	3.6	10.0	13.7
SPACECRAFT MISSION EQUIPMENT	51.2	19.5	70.7 2.7	32.2	33.4	65.7 2.6
SATELLITE QUALIFICATION UNIT(S)						68.2
GSE (AGE)						1.6
LAUNCH SITE SUPPORT						4.7
CONTRACTOR FEE						
TOTAL SATELLITE						74.5
AVERAGE UNIT COST (2 SATELLITES)						37.3
TOTAL SATELLITE DDT+E AND RECURRING COST						156.8

491-11N

NL1-1-2 VOIR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851186.	580324.	719594.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	46967.	46764.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	357673.	426826.
1803	EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	578119.	596760.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55765.	54496.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23550.	27842.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1634770.	139061.	287682.	879626.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	5035800.	184082.	380820.	2414265.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	58418.	23799.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	95343.	221512.
354	TRANSMITTER	4	2.8	90.0	1.00	148403.	108185.	178066.	129227.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	21769.	18684.

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NL1-1-2 VOIR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.5	0.0	.10	66515.	37879.	138287.	128677.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	81.0	1.00	650057.	134042.	308144.	129877.
WIRING HARNESS	572.0	1.00	1788536.	1052166.	1280978.	357337.
THERMAL CONTROL	61.1	1.00	1813700.	178172.	154459.	362364.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PROPULSION FEED SYS	1201.7	1.00	4948443.	4501141.	3449158.	988664.
STRUCTURE	1193.9	1.00	7074477.	4483011.	2576449.	1413431.
POWER CONTROL UNITS	143.7	1.00	980098.	468813.	538867.	195817.
SOLAR ARRAY DRIVE	13.4	1.00	580420.	266023.	305774.	115964.
SATELLITE ADAPTER	254.3	1.00	425051.	273650.	90884.	84922.

PROPELLANT WEIGHT 4769.4

MISSION EQUIP WEIGHT 300.0

TOTAL SATELLITE WEIGHT 8885.5

VII-166

**** SATELLITE SYSTEMS COST MODEL ****

NL 1-1-3 MER ORB

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 5000. NUMBER OF QUAL UNITS = 0
BOL POWER = 740. ARRAY AREA = 60.1 SQ FT BATT CAP = 36. AMP-HR

VII-167

SPACECRAFT COST MODEL

AL1-1-3 MEF ORB

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.2	1.4	6.6	2.1	1.9	4.0
THERMAL CONTROL	.6	.2	.8	.2	.3	.5
ELECTRICAL POWER	2.4	.6	3.0	1.2	1.4	2.6
COMMUNICATIONS	1.2	.4	1.7	.7	.9	1.6
DATA HANDLING	6.8	.4	7.3	2.7	1.1	3.8
STABILITY AND CONTROL	5.7	1.4	7.1	2.3	2.5	4.8
AUXILIARY PROPULSION	1.9	1.0	2.9	1.0	1.7	2.7
SPACECRAFT	23.8	5.5	29.3	10.3	9.8	20.1
MISSION EQUIPMENT			16.0			12.7
SATELLITE			45.3			32.7
QUALIFICATION UNIT(S)			0.0			
GSE (ACF)			2.1			.8
LAUNCH SITE SUPPORT						1.5
CONTRACTOR FEE			2.2			
TOTAL SATELLITE			49.6			35.0
AVERAGE UNIT COST (2 SATELLITES)						17.5
TOTAL SATELLITE DDT+E AND RECURRING COST						84.6

891-118

NL1-1-3 MER DRB

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	1	10.0	4.0	1.00	1349183.	500699.	322401.	269557.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1718	RATE INTEGR GYRO	1	9.6	32.0	1.00	800266.	172894.	198707.	159887.
1803	EARTH SENSOR	1	14.6	19.0	1.00	1118880.	282384.	321177.	223544.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	951713.	139061.	159823.	190146.
406	COMMD DECOD+DISTR	1	11.0	5.5	1.00	3071226.	184082.	211566.	613609.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	52968.	82978.
354	TRANSMITTER	3	2.8	90.0	1.00	135921.	83756.	139519.	94093.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	12094.	6999.

691-169

NL1-1-3 MER ORB

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	31.5	0.0	.10	37808.	27357.	99874.	73141.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	41.9	1.00	86679.	32306.	74266.	17318.
WIRING HARNESS	42.1	1.00	195712.	115134.	140172.	39102.
THERMAL CONTROL	31.5	1.00	358953.	113700.	104831.	71716.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PFCPULSION FEED SYS	101.6	1.00	1131124.	680068.	521126.	225991.
STRUCTURE	157.9	1.00	2532397.	803104.	461555.	505955.
POWER CONTROL UNITS	52.2	1.00	665834.	35555.	40868.	133029.
SOLAR ARRAY DRIVE	6.9	1.00	370088.	151322.	173933.	73941.
SATELLITE ADAPTER	68.1	1.00	138698.	62444.	42049.	27711.

PROPELLANT WEIGHT 242.9

MISSION EQUIP WEIGHT 950.0

TOTAL SATELLITE WEIGHT 1860.4

VII-170

**** SATELLITE SYSTEMS COST MODEL ****
NLI-1-A SAT-ORAN

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 303. ARRAY AREA = 65.4 SQ FT BATT CAP = 18. AMP-HR

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11-171

66

SPACECRAFT COST MODEL

NL1-1-4 SAT-URAN

(MILLIONS OF 1977 DOLLARS)

VII-172

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.4	1.0	3.4	2.3	2.1	4.4
THERMAL CONTROL	1.0	.1	1.1	.9	.4	1.3
ELECTRICAL POWER	2.2	.8	3.0	2.3	2.6	5.0
COMMUNICATIONS	1.2	.5	1.7	2.0	1.8	3.9
DATA HANDLING	2.8	.3	3.1	2.7	1.1	3.8
STABILITY AND CONTROL	2.9	1.2	4.1	4.9	3.3	8.2
AUXILIARY PROPULSION	1.9	1.0	2.8	2.2	2.9	5.2
SPACECRAFT MISSION EQUIPMENT	14.4	4.8	19.2 10.2	17.4	14.3	31.8 14.3
SATELLITE QUALIFICATION UNIT(S)			29.4 0.0			46.1
GSE (AGE)			1.4			1.4
LAUNCH SITE SUPPORT						2.3
CONTRACTOR FEE			1.4			
TOTAL SATELLITE			32.3			49.8
AVERAGE UNIT COST (4 SATELLITES)						12.4
TOTAL SATELLITE DDT+E AND RECURRING COST						82.1

NL1-1-4 SAT-URAN

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	27032.	56260.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
803	EARTH SENSOR	3	1.3	0.0	1.00	157133.	77682.	93038.	91819.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	364321.	139061.	143841.	87331.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	1294909.	47819.	49463.	310403.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	128713.	201169.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.

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NL1-1-4 SAT-URAN

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213	BATTERY	2	17.2	0.0	.10	21490.	17695.1	63209.	38683.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.2	1.00	91365.	26408.	54637.	21901.
WIRING HARNESS	41.1	1.00	191763.	112811.	123609.	45967.
THERMAL CONTROL	21.1	1.00	562203.	86650.	74633.	134766.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	94.6	1.00	1082118.	643925.	444088.	259395.
STRUCTURE	128.8	1.00	1355424.	675423.	349358.	324909.
POWER CONTROL UNITS	42.9	1.00	394920.	31699.	32792.	94666.
SATELLITE ADAPTER	29.6	1.00	45541.	28529.	23244.	10917.
PROPELLANT WEIGHT	184.7					
MISSION EQUIP. WEIGHT	85.0					
TOTAL SATELLITE WEIGHT	808.5					

VII-174

**** SATELLITE SYSTEMS COST MODEL ****
NLF-1-5 PC FLYBY

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
ROL POWER = 1072. ARRAY AREA = 84.2 SQ FT BATT CAP = 100. AMP-HR

V11-175

SPACECRAFT COST MODEL

NLI-1-5 DC FLYBY

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.0	1.2	5.2	1.6	1.8	3.4
THERMAL CONTROL	1.3	.2	1.4	.5	.3	.8
ELECTRICAL POWER	2.8	.9	3.7	1.6	2.7	4.4
COMMUNICATIONS	1.6	.6	2.3	1.4	1.5	2.9
DATA HANDLING	4.9	.3	5.2	2.6	1.0	3.6
STABILITY AND CONTROL	4.2	1.6	5.8	2.8	2.4	5.3
AUXILIARY PROPULSION	1.4	.7	2.1	.9	1.3	2.3
SPACECRAFT	20.3	5.5	25.7	11.6	11.1	22.7
MISSION EQUIPMENT			26.6			23.9
SATELLITE			52.4			46.6
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.8			
LAUNCH SITE SUPPORT						.9
CONTRACTOR FEE			1.9			1.7
TOTAL SATELLITE			56.1			49.1
AVERAGE UNIT COST (2 SATELLITES)						24.5
TOTAL SATELLITE DDT+E AND RECURRING COST						105.2

NLI-176

NL1-1-5 DC FLYBY

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	23269.	20013.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	336026.	234322.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	76866.	75651.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42390.	43351.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	720079.	139061.	287682.	345220.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2171338.	47819.	54958.	433818.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	143014.	221512.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	139708.	82800.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	12094.	6999.

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NL1-1-5 DC FLYBY

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	179842.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	58.6	1.00	518518.	99325.	228334.	103596.
WIRING HARNESS	51.7	1.00	232952.	137042.	166844.	46542.
THERMAL CONTROL	40.4	1.00	736217.	134596.	121259.	147091.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	60.3	1.00	796417.	456269.	349633.	159119.
STRUCTURE	122.6	1.00	1788938.	647685.	372234.	357417.
POWER CONTROL UNITS	82.1	1.00	827046.	337892.	388383.	165238.
SOLAR ARRAY DRIVE	9.7	1.00	466226.	202132.	232336.	93149.
SATELLITE ADAPTER	41.6	1.00	91228.	39514.	31516.	18227.
PROPELLANT WEIGHT	65.1					
MISSION EQUIP WEIGHT	340.0					

TOTAL SATELLITE WEIGHT 1143.1

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**** SATELLITE SYSTEMS COST MODEL ****

NL1-1-6 SP/T LADR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - NUCLEAR POWER GENERATION

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323.1 NUMBER OF QUAL UNITS = 0

671-179

SPACECRAFT COST MODEL

NL1-1-6 SO/T LNDR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.0	4.6	10.6	0.0	3.0	3.0
THERMAL CONTROL	1.4	.3	1.7	0.0	.3	.3
ELECTRICAL POWER	10.1	20.5	30.6	0.0	14.7	14.7
COMMUNICATIONS	1.6	.6	2.3	.6	.9	1.4
DATA HANDLING	8.2	.3	8.5	.9	.5	1.4
STABILITY AND CONTROL	4.2	1.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.5	.8	2.3	.2	.8	1.0
SPACECRAFT	33.1	28.6	61.8	2.4	21.5	23.9
MISSION EQUIPMENT			54.6			31.0
SATELLITE			116.3			54.9
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT						.7
CONTRACTOR FEE			4.5			1.7
TOTAL SATELLITE			123.5			57.4
AVERAGE UNIT COST (1 SATELLITES)						57.4
TOTAL SATELLITE DDT+E AND RECURRING COST						180.8

NL1-1-6 SO/T LNR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1252821.	139061.	319646.	500609.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3573083.	47819.	61065.	0.

COMMUNICATIONS

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

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NL1-1-6 SO/T LNDR

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	525.0	1.00	4649079.	14123328.	9017745.	0.
WIRING HARNESS	381.9	1.00	1269753.	746974.	1010461.	0.
THERMAL CONTROL	65.5	1.00	844268.	186774.	178747.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	69.7	1.00	876678.	509744.	434009.	0.
STRUCTURE	806.3	1.00	3226447.	3211214.	2050583.	0.
SATELLITE ADAPTER	178.1	1.00	314023.	105859.	81989.	0.
PROPELLANT WEIGHT	164.2					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE WEIGHT 3320.6						

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**** SATELLITE SYSTEMS COST MODEL ****
NL1-1-7 MARS POLR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 5000. NUMBER OF QUAL UNITS = 0
BOL POWER = 892.4 ARRAY AREA = 72.4 SQ FT BATT CAP = 34. AMP-HR

VII-183

SPACECRAFT COST MODEL

NL1-1-7 MARS POLR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.8	2.4	9.2	2.7	3.1	5.8
THERMAL CONTROL	1.4	.2	1.6	.6	.3	.9
ELECTRICAL POWER	3.3	1.0	4.3	1.5	2.4	3.9
COMMUNICATIONS	0.0	0.0	0.0	0.0	0.0	0.0
DATA HANDLING	7.5	.4	8.0	6.2	1.5	7.8
STABILITY AND CONTROL	6.3	2.1	8.4	6.0	4.4	10.4
AUXILIARY PROPULSION	4.6	2.9	7.5	2.1	4.7	6.7
SPACECRAFT MISSION EQUIPMENT	29.9	9.1	39.0 36.9	19.1	16.4	35.6 35.9
SATELLITE QUALIFICATION UNIT(S)			75.9 0.0			71.5
GSE (AGE)			2.5			
LAUNCH SITE SUPPORT						1.1
CONTRACTOR FEE			2.9			2.6
TOTAL SATELLITE			81.3			75.2
AVERAGE UNIT COST (2 SATELLITES)						37.6
TOTAL SATELLITE DDT+E AND RECURRING COST						156.4

781-117

NL1-1-7 MARS POLR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851188.	580324.	719594.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	357673.	426826.
1803	EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	578119.	596760.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	1057507.	139061.	159823.	211282.
406	COMMND DECOD+DISTR	2	11.0	5.5	1.00	3376634.	184082.	380820.	1618827.

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.1	0.0	.10	36087.	28995.	105854.	69812.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	50.4	1.00	97339.	37212.	85545.	19448.
WIRING HARNESS	174.0	1.00	651946.	383529.	466934.	130254.
THERMAL CONTROL	32.8	1.00	828092.	116860.	107341.	165447.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PROPULSION FEED SYS	427.2	1.00	2688118.	2040382.	1563515.	537067.
STRUCTURE	319.8	1.00	3387025.	1463166.	840902.	676704.
POWER CONTROL UNITS	61.1	1.00	742727.	38985.	44810.	148392.
SOLAR ARRAY DRIVE	8.4	1.00	422889.	178862.	205588.	84490.
SATELLITE ADAPTER	102.0	1.00	195527.	95917.	53259.	39065.

PROPELLANT WEIGHT 930.4

MISSION EQUIP WEIGHT 600.0

TOTAL SATELLITE WEIGHT 2931.5

VI-185

✓ 11

**** SATELLITE SYSTEMS COST MODEL ****

NL1-1-8 TOP SEPS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - NUCLEAR POWER GENERATION

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0

981-111A

SPACECRAFT COST MODEL

NL1-1-8 JUP SEPS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.2	3.6	8.9	0.0	2.4	2.4
THERMAL CONTROL	1.5	.2	1.7	0.0	.2	.2
ELECTRICAL POWER	7.3	14.5	21.8	0.0	10.3	10.3
COMMUNICATIONS	1.7	.7	2.4	.7	1.0	1.6
DATA HANDLING	4.8	.3	5.0	2.7	1.0	3.6
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	3.1	3.2	6.3	1.3	1.7	3.0
SPACECRAFT MISSION EQUIPMENT	28.0	24.4	52.5	6.4	18.4	24.8
			11.4			5.2
SATELLITE QUALIFICATION UNIT(S)			63.9			30.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE						.7
			3.8			1.8
TOTAL SATELLITE			70.1			32.5
AVERAGE UNIT COST (1 SATELLITES)						32.5
TOTAL SATELLITE DDT+E AND RECURRING COST						102.6

VII-187

76

NL1-1-8 JUP SEPS-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	1.00	142484.	701098.	167720.	436376.
834	THRUSTER	10	.7	.1	1.00	149104.	560952.	142640.	306397.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	793900.	139061.	575364.	761223.
403	COMM DECOD+DISTR	2	2.3	7.5	1.00	2008641.	47819.	109917.	802625.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASERND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	2	3.9	6.3	1.00	85447.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	24188.	15573.

881-111

NL1-1-8 JUP SEPS-2

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	U.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	350.0	1.00	3534183.	10083207.	6438128.	0.
WIRING HARNESS	203.7	1.00	745161.	438366.	592995.	0.
THERMAL CONTROL	48.8	1.00	857684.	152986.	150474.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	179.9	1.00	1556629.	1052877.	896447.	0.
STRUCTURE	609.0	1.00	2890243.	2529716.	1615400.	0.
SATELLITE ADAPTER	102.1	1.00	195690.	88432.	59210.	0.
PROPELLANT WEIGHT	864.3					
MISSION EQUIP WEIGHT	150.0					

TOTAL SATELLITE WEIGHT 2697.3

681-11A

**** SATELLITE SYSTEMS COST MODEL ****

NL1-1-9 ENCKE RD2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 783. ARRAY AREA = 61.6 SQ FT BATT CAP = 72. AMP-HR

061-117

SPACECRAFT COST MODEL

NL1-1-9 ENCKE RDZ

(MILLIONS OF 1977 DOLLARS)

161-11A

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.4	1.1	4.5	0.0	.9	.9
THERMAL CONTROL	1.1	.2	1.3	0.0	.2	.2
ELECTRICAL POWER	2.3	.7	3.1	.2	1.2	1.5
COMMUNICATIONS	1.6	.6	2.3	.5	.8	1.4
DATA HANDLING	4.3	.3	4.5	.4	.5	1.0
STABILITY AND CONTROL	4.2	1.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.3	.7	2.1	.2	.7	.9
SPACECRAFT	18.4	5.1	23.5	2.2	5.7	7.9
MISSION EQUIPMENT			23.8			11.5
SATELLITE			47.3			19.4
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.7			
LAUNCH SITE SUPPORT						.4
CONTRACTOR FEE			1.8			.6
TOTAL SATELLITE			50.7			20.4
AVERAGE UNIT COST (1 SATELLITES)						20.4
TOTAL SATELLITE DDT+E AND RECURRING COST						71.1

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NL1-1-9 ENCKE RDZ

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRONCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	621459.	139061.	319646.	248326.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1901929.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

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NL1-1-9 ENCKE RDZ

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.5	0.0	.10	66515.	37879.	140048.	134229.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	42.9	1.00	416632.	74412.	190068.	0.
WIRING HARNESS	45.0	1.00	207086.	121825.	164797.	0.
THERMAL CONTROL	32.1	1.00	645197.	115163.	117772.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	57.3	1.00	769573.	438800.	373606.	0.
STRUCTURE	111.1	1.00	1581119.	595666.	380375.	0.
POWER CONTROL UNITS	64.3	1.00	688202.	292881.	374050.	0.
SOLAR ARRAY DRIVE	7.1	1.00	377328.	155042.	198010.	0.
SATELLITE ADAPTER	35.5	1.00	53150.	33600.	31916.	0.

PROPELLANT WEIGHT 54.6

MISSION EQUIP WEIGHT 286.0

TOTAL SATELLITE WEIGHT 662.5

VI-193

**** SATELLITE SYSTEMS COST MODEL ****
NL 1-1-10 MULT-RETR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 784. ARRAY AREA = 61.6 SQ FT BATT CAP = 72. AMP-HR

761-117

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SPACECRAFT COST MODEL

NLI-1-10 MULT-ASTR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.0	1.2	5.1	0.0	.9	.9
THERMAL CONTROL	1.1	.2	1.3	0.0	.2	.2
ELECTRICAL POWER	2.4	.8	3.2	.2	1.3	1.5
COMMUNICATIONS	1.6	.6	2.3	.5	.8	1.4
DATA HANDLING	5.3	.3	5.6	.5	.5	1.1
STABILITY AND CONTROL	4.2	.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.3	.7	2.1	.2	.7	.9
SPACECRAFT MISSION EQUIPMENT	20.0	.2	25.2	2.3	5.8	8.1
			34.3			17.8
SATELLITE QUALIFICATION UNIT(S)			59.6			25.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			
CONTRACTOR FEE			1.9			.4
						.6
TOTAL SATELLITE			63.3			26.9
AVERAGE UNIT COST (1 SATELLITES)						26.9
TOTAL SATELLITE DDT+E AND RECURRING COST						90.2

7/11-195

NL1-1-10 MULT-ASTR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	781859.	139061.	319646.	312420.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2338190.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

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NL1-1-10 MULT-ASTR

ELECTRICAL POWER

IDFNT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.6	0.0	.10	66515.	37934.	140251.	134229.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
SOLAR ARRAY	42.9	1.00	416632.	74412.	190068.	0.
WIRING HARNESS	53.4	1.00	239431.	140853.	190538.	0.
THERMAL CONTROL	33.0	1.00	657141.	117343.	119693.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	57.3	1.00	769573.	438800.	373606.	0.
STRUCTURE	120.7	1.00	1864268.	639143.	408137.	0.
POWER CONTROL UNITS	64.3	1.00	668716.	292881.	374050.	0.
SOLAR ARRAY DRIVE	7.1	1.00	377328.	155042.	198010.	0.
SATELLITE ADAPTER	44.6	1.00	96790.	41517.	36474.	0.

PROPELLANT WEIGHT 54.7

MISSION EQUIP WEIGHT 500.0

TOTAL SATELLITE WEIGHT 1205.6

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NL1-1-10

**** SATELLITE SYSTEMS COST MODEL ****

NL1-1-11 JUP SW62Y

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPELLSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0

BOL POWER = 516. ARRAY AREA = 59.8 SQ FT BATT CAP = 34. AMP-HR

✓
861-111

SPACECRAFT COST MODEL

NL1-1-11 JUP SWGBY

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.9	1.5	3.4	0.0	1.0	1.0
THERMAL CONTROL	.9	.2	1.1	0.0	.2	.2
ELECTRICAL POWER	2.0	.7	2.7	.1	1.1	1.2
COMMUNICATIONS	1.6	.6	2.2	.4	.7	1.2
DATA HANDLING	2.7	.3	3.0	0.0	.3	.3
STABILITY AND CONTROL	4.0	1.1	5.2	.0	1.0	1.1
AUXILIARY PROPULSION	.9	.5	1.5	.2	.5	.7
SPACECRAFT MISSION EQUIPMENT	14.1	4.9	19.0 8.3	.8	4.9	5.7 3.3
SATELLITE QUALIFICATION UNIT(S)			27.3 0.0			9.1
GSE (AGE)			1.4			
LAUNCH SITE SUPPORT						.4
CONTRACTOR FEE			1.4			.4
TOTAL SATELLITE			30.1			9.9
AVERAGE UNIT COST (1 SATELLITES)						9.9
TOTAL SATELLITE DDT+E AND RECURRING COST						40.0

661-199

58

NL1-1-11 JUP SHGBY

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038361.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	353561.	139061.	177581.	0.
403	COMMD RECD+DISTR	1	2.3	7.5	1.00	1260459.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	CCMMANC SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

VII-200

NL1-1-11 JUP SWGBY

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.2	0.0	.10	36087.	28995.	107202.	72824.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	29.4	1.00	408072.	52441.	133950.	0.
WIRING HARNESS	37.6	1.00	177822.	104610.	141510.	0.
THERMAL CONTROL	39.5	1.00	513894.	132555.	132968.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	34.3	1.00	535045.	296332.	252305.	0.
STRUCTURE	219.5	1.00	1095184.	1062592.	678539.	0.
POWER CONTROL UNITS	69.2	1.00	539219.	305738.	390470.	0.
SATELLITE ADAPTER	31.5	1.00	48014.	25603.	29760.	0.
PROPELLANT WEIGHT	27.2					
MISSION EQUIP WEIGHT	60.0					

TOTAL SATELLITE WEIGHT 725.7

VII-201

**** SATELLITE SYSTEMS COST MODEL ****

NLI-1-12 MARS SSR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 5000. NUMBER OF QUAL UNITS = 0
BOL POWER = 1587. ARRAY AREA = 128.9 SQ FT BATT CAP = 72. AMP-HR

VII-202

SPACECRAFT COST MODEL

NL1-1-12 MARS SSR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	12.5	4.8	17.3	0.0	3.4	3.4
THERMAL CONTROL	2.2	.2	2.4	0.0	.2	.2
ELECTRICAL POWER	6.2	2.4	8.6	.2	3.4	3.7
COMMUNICATIONS	1.4	.7	2.1	.8	.8	1.6
DATA HANDLING	16.2	.4	16.7	6.5	1.1	7.5
STABILITY AND CONTROL	6.5	2.4	9.0	3.3	2.8	6.2
AUXILIARY PROPULSION	5.6	3.7	9.2	.1	3.3	3.4
SPACECRAFT	50.5	14.7	65.2	11.0	15.0	25.9
MISSION EQUIPMENT			96.3			60.1
SATELLITE			161.5			86.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			3.6			.8
LAUNCH SITE SUPPORT						1.9
CONTRACTOR FEE			4.8			
TOTAL SATELLITE			170.0			88.7
AVERAGE UNIT COST (1 SATELLITES)						88.7
TOTAL SATELLITE DDT+E AND RECURRING COST						258.6

VII-203

NL1-1-12 MARS SSR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851188.	644803.	599765.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	397414.	355749.
1803	EARTH SENSOR	3	14.6	19.0	1.00	1370628.	677722.	905940.	964568.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	2612597.	139061.	319646.	043957.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	6920213.	184082.	423133.	765219.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	105936.	184625.
354	TRANSMITTER	5	2.8	90.0	1.00	160886.	132614.	239065.	190285.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	24188.	15573.

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NL1-1-12 MARS SSR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.5	0.0	.10	66515.	37879.	140048.	134229.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.7	1.00	698591.	147323.	376304.	0.
WIRING HARNESS	437.0	1.00	1423489.	837415.	1132804.	0.
THERMAL CONTROL	50.6	1.00	1273883.	156790.	153697.	0.
POWER CONVERTERS	10.0	1.00	410936.	256004.	163477.	0.
PROPULSION FEED SYS	589.5	1.00	3252292.	2610350.	2222520.	0.
STRUCTURE	734.9	1.00	6335617.	2967844.	1895175.	0.
POWER CONTROL UNITS	145.9	1.00	1040406.	472999.	604085.	0.
SOLAR ARRAY DRIVE	14.9	1.00	623714.	291131.	371814.	0.
SATELLITE ADAPTER	226.8	1.00	385650.	226414.	94443.	0.
PROPELLANT WEIGHT	2300.6					
MISSION EQUIP WEIGHT	2380.0					

TOTAL SATELLITE WEIGHT 7282.3

NL1-205

**** SATELLITE SYSTEMS COST MODEL ****

NL2-1-1 TR0

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 590. ARRAY AREA = 46.4 SQ FT BATT CAP = .56. AMP-HR

VII-206

SPACECRAFT COST MODEL

NL2-1-1 TBD

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.0	1.4	6.4	0.0	1.1	1.1
THERMAL CONTROL	1.1	.2	1.3	0.0	.2	.2
ELECTRICAL POWER	1.6	.3	1.9	.2	.6	.8
COMMUNICATIONS	1.6	.6	2.2	.4	.7	1.2
DATA HANDLING	6.8	.3	7.0	.7	.5	1.2
STABILITY AND CONTROL	4.0	1.1	5.2	.0	1.0	1.1
AUXILIARY PROPULSION	1.9	1.1	3.0	.3	1.1	1.4
SPACECRAFT MISSION EQUIPMENT	21.9	5.0	26.9	1.7	5.2	6.9
			3.2			1.7
SATELLITE QUALIFICATION UNIT(S)			30.2			8.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			.4
CONTRACTOR FEE			2.0			.5
TOTAL SATELLITE			34.1			9.5
AVERAGE UNIT COST (1 SATELLITES)						9.5
TOTAL SATELLITE DDT+E AND RECURRING COST						43.6

VI-207

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NL2-1-1 TBO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25955.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1016129.	139061.	319646.	406031.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2959721.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

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NL2-1-1 TRO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
254	BATTERY	2	45.6	0.0	.10	54196.	35677.	131908.	109368.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.3	1.00	73778.	26471.	67614.	0.
WIRING HARNESS	49.0	1.00	222593.	130948.	177138.	0.
THERMAL CONTROL	38.8	1.00	635711.	130958.	131584.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.4	1.00	1082118.	673915.	573789.	0.
STRUCTURE	166.6	1.00	2483003.	840564.	536759.	0.
POWER CONTROL UNITS	47.6	1.00	583195.	33687.	43023.	0.
SOLAR ARRAY DRIVE	5.4	1.00	313421.	122861.	156911.	0.
SATELLITE ADAPTER	66.4	1.00	135750.	61196.	46035.	0.
PROPELLANT WEIGHT	269.8					
MISSION EQUIP WEIGHT	844.0					

TOTAL SATELLITE WEIGHT 1820.6

VII-209

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SATELLITE SYSTEMS COST MODEL

201-1-1 EMS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-SEPARATE ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 920. NUMBER OF QUAL UNITS = 0

BOL POWER = 1194. ARRAY AREA = 96.9 SQ FT BATT CAP = 34. AMP-HR

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SPACECRAFT COST MODEL

CJ1-1-1 EMS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.1	1.2	6.3	3.6	2.6	6.2
THERMAL CONTROL	.7	.2	.8	.5	.4	.9
ELECTRICAL POWER	3.0	.8	3.9	2.4	3.6	6.0
COMMUNICATIONS	.8	.4	1.2	1.0	1.3	2.3
DATA HANDLING	7.8	1.1	8.9	7.7	3.1	10.8
STABILITY AND CONTROL	4.1	1.6	5.7	4.3	3.3	7.7
AUXILIARY PROPULSION	1.4	.8	2.2	1.6	2.0	3.7
SPACECRAFT	22.9	6.0	28.9	21.1	16.4	37.6
MISSION EQUIPMENT			49.2			72.2
SATELLITE			78.1			109.7
QUALIFICATION UNIT(S)			0.0			0.0
GSE (AGE)			2.0			2.0
LAUNCH SITE SUPPORT			2.2			1.4
CONTRACTOR FEE						2.7
TOTAL SATELLITE			82.3			113.8
AVERAGE UNIT COST (3 SATELLITES)						37.9
TOTAL SATELLITE DDT+E AND RECURRING COST						196.1

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CDI-1-1 EMS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	21378.	23497.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	32645.	28313.
1803	EARTH SENSOR	1	14.6	19.0	1.00	1118880.	282384.	301980.	262468.
2203	CONTROL ELECTRONICS	2	7.1	62.0	1.00	1154954.	749743.	429049.	533024.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	99239.	93676.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41909.	41743.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1045773.	139061.	270487.	482636.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	408520.	316890.
403	COMM. DECOD+DISTR	1	2.3	7.5	1.00	3037269.	47819.	51673.	712484.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
103	RASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
227	ANTENNA	4	.3	0.0	1.00	66452.	85474.	24717.	51774.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	78763.	46846.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	81094.	48488.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

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C31-1-1 EMS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
233	BATTERY	2	26.8	0.0	.10	36087.	24319.1	87778.	67222.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
SOLAR ARRAY	67.5	1.00	572100.	113219.	244718.	134204.
WIRING HARNESS	69.9	1.00	300845.	176982.	202591.	70572.
THERMAL CONTROL	30.5	1.00	388610.	111240.	96723.	91160.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	62.4	1.00	790887.	468376.	337458.	185527.
STRUCTURE	115.2	1.00	2339450.	614302.	331946.	548790.
POWER CONTROL UNITS	61.3	1.00	880872.	264808.	307779.	206636.
SOLAR ARRAY DRIVE	11.2	1.00	513967.	228410.	246849.	120567.
SATELLITE ADAPTER	59.8	1.00	124192.	55113.	36641.	29133.
PROPELLANT WEIGHT	56.6					
MISSION EQUIP WEIGHT	900.0					

TOTAL SATELLITE WEIGHT 1629.1

VII-2/4

**** SATELLITE SYSTEMS COST MODEL ****
C01-1-2 G0E3-1 V

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 443. ARRAY AREA = 137.0 SQ FT BATT CAP = 28. AMP-HR

V11-215

SPACECRAFT COST MODEL

CO1-1-2 GOES-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	2.1	5.4	2.3	3.5	5.8
THERMAL CONTROL	1.3	.2	1.5	.9	.4	1.3
ELECTRICAL POWER	3.7	1.4	5.1	2.9	4.7	7.6
COMMUNICATIONS	1.6	.6	2.2	2.2	2.4	4.5
DATA HANDLING	5.3	1.1	6.4	5.9	3.6	9.5
STABILITY AND CONTROL	3.3	1.3	4.7	4.4	3.0	7.4
AUXILIARY PROPULSION	1.7	.8	2.5	1.5	2.0	3.6
SPACECRAFT MISSION EQUIPMENT	20.2	7.5	27.7 20.0	20.1	19.6	39.7 25.7
SATELLITE QUALIFICATION UNIT(S)			47.7			65.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			1.4
CONTRACTOR FEE			2.1			2.9
TOTAL SATELLITE			51.6			69.7
AVERAGE UNIT COST (3 SATELLITES)						23.2
TOTAL SATELLITE DDT+E AND RECURRING COST						121.3

VII-216

C01-1-2 GOES-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	28241.	59635.
403	NUTATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	25909.	39666.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397402.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	653183.	139061.	270487.	301451.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	521388.	389274.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1989032.	47819.	51673.	466588.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49142.	27399.	54927.	22910.
202	ANTENNA	2	8.4	0.0	1.00	388837.1	233007.	115423.	179453.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	121641.	72732.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	60886.	39666.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	49695.	14075.
603	DIPLEXER	2	3.1	1.0	1.00	63868.1	26267.	33422.	29476.

VII-217

CO1-1-2 GOES-1.

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.5	0.0	.10	30816.	26095.	94186.	57384.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	67.0	1.00	729138.	112443.	243039.	171018.
WIRING HARNESS	80.0	1.00	337823.	198442.	227156.	79129.
THERMAL CONTROL	34.0	1.00	760184.	119742.	103069.	178324.
POWER CONVERTERS	16.0	1.00	592909.	369370.	199594.	139085.
PROPULSION FEED SYS	79.0	1.00	966749.	561001.	404192.	226781.
STRUCTURE	317.0	1.00	1812530.	1452270.	784753.	425185.
POWER CONTROL UNITS	71.0	1.00	493187.	310366.	335420.	115692.
SATELLITE ADAPTER	57.0	1.00	119231.	46674.	35627.	27969.

PROPELLANT WEIGHT 169.0

MISSION EQUIP WEIGHT 247.0

TOTAL SATELLITE WEIGHT 1372.0

812-11A

**** SATELLITE SYSTEMS COST MODEL ****

C-01-1-3 G-000-2 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 583. ARRAY AREA = 180.0 SQ FT BATT CAP = 36. AMP-HR

V11-219

SPACECRAFT COST MODEL

CO1-1-3 GOES-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	2.8	6.8	6.9	11.0	17.9
THERMAL CONTROL	1.4	.2	1.6	2.5	1.2	3.6
ELECTRICAL POWER	4.3	1.6	5.9	8.1	12.8	21.0
COMMUNICATIONS	1.6	.6	2.2	4.5	5.4	9.9
DATA HANDLING	6.6	1.1	7.6	15.2	8.3	23.5
STABILITY AND CONTROL	3.3	1.3	4.5	8.3	6.1	14.4
AUXILIARY PROPULSION	1.7	.8	2.5	3.7	4.8	8.5
SPACECRAFT MISSION EQUIPMENT	22.7	8.4	31.1 32.1	49.2	49.5	98.7 95.6
SATELLITE QUALIFICATION UNIT(S)			63.2			194.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.3			3.9 7.2
TOTAL SATELLITE			67.6			205.5
AVERAGE UNIT COST (8 SATELLITES)						25.7
TOTAL SATELLITE DDT+E AND RECURRING COST						273.0

VII-220

196

COI-1-3 GOES-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	18724.	36101.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	24329.	45825.
403	ROTATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	22320.	30480.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	380783.	422774.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	87669.	77770.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72127.	60647.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	847453.	139061.	233023.	300534.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	449173.	272943.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2513899.	47819.	44516.	547265.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	47319.	17605.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	99437.	137894.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	101780.	53996.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	104794.	55888.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	524534.	30480.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	42812.	10183.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	28793.	22650.

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CO1-1-3 GUES-2

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	40.0	0.0	.10	37808.	32491.	112127.	60811.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COS
SOLAR ARRAY	89.0	1.00	882544.	146258.	272345.	192126
WIRING HARNESS	103.0	1.00	417938.	245866.	242461.	90983
THERMAL CONTROL	43.0	1.00	829040.	140409.	101870.	180478
POWER CONVERTERS	16.0	1.00	592909.	369370.	171949.	129074
PROPULSION FEED SYS	79.0	1.00	966749.	561001.	348210.	210457
STRUCTURE	462.0	1.00	2162687.	2000289.	931175.	470808
POWER CONTROL UNITS	90.0	1.00	579137.	356549.	331962.	126076
SATELLITE ADAPTER	80.0	1.00	159046.	61288.	37425.	34624
PROPELLANT WEIGHT	169.0					
MISSION EQUIP WEIGHT	450.0					

TOTAL SATELLITE WEIGHT 1837.0

VII-222

191

**** SATELLITE SYSTEMS COST MODEL ****
CP1-2-1 ALWEMTC✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 427. NUMBER OF QUAL UNITS = 0
BOL POWER = 3605. ARRAY AREA = 293.0 SQ FT BATT C/P = 100. AMP-HR

VI-223

SPACECRAFT COST MODEL

CD1-2-1 ALWEMIC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.3	10.0	3.1	3.7	6.7
THERMAL CONTROL	1.0	.4	1.4	.4	.6	1.0
ELECTRICAL POWER	6.0	1.6	7.6	2.9	5.2	8.1
COMMUNICATIONS	.8	.4	1.2	.8	1.0	1.8
DATA HANDLING	10.5	1.1	11.5	6.4	2.2	8.6
STABILITY AND CONTROL	4.5	1.9	6.4	4.4	3.3	7.6
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	31.9	8.5	40.4 61.8	19.1	17.7	36.8 63.7
SATELLITE QUALIFICATION UNIT(S)			102.3			100.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			
CONTRACTOR FEE			3.0			1.1 2.7
TOTAL SATELLITE			107.9			104.3
AVERAGE UNIT COST (2 SATELLITES)						92.1
TOTAL SATELLITE DDT+E AND RECURRING COST						212.1

COI-2-1 ALWEMIC

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1484954.	139061.	287682.	711917.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	434489.	345879.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	4163333.	47819.	54958.	831804.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	83769.	48664.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-225

CO1-2-1 ALWEMIC

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.0	0.0	.10	86935.	49112.	179297.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	204.0	1.00	1241232.	315285.	724794.	247989.
WIRING HARNESS	126.0	1.00	495838.	291693.	355127.	99065.
THERMAL CONTROL	115.0	1.00	581651.	273563.	223608.	116210.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	72.0	1.00	864227.	522562.	400432.	172667.
STRUCTURE	199.0	1.00	3244028.	977625.	561854.	648134.
POWER CONTROL UNITS	167.0	1.00	1681338.	511890.	588381.	335919.
SOLAR ARRAY DRIVE	34.0	1.00	1091210.	586998.	674712.	218016.
SATELLITE ADAPTER	93.0	1.00	180762.	87112.	50457.	36115.

PROPELLANT WEIGHT 137.0

MISSION EQUIP WEIGHT 1188.0

TOTAL SATELLITE WEIGHT 2647.0

922-11A

**** SATELLITE SYSTEMS COST MODEL ****

C02-1-1 0P SEABAT ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APCGEE = 440. NUMBER OF QUAL UNITS = 0
BOL POWER = 4092. ARRAY AREA = 332.0 SQ FT BATT CAP = 100. AMP-HR

VII-227

205

SPACECRAFT COST MODEL

CO2-1-1 OP SEASAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+F-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+F	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	9.2	2.5	11.6	12.7	10.1	22.8
THERMAL CONTROL	1.0	.4	1.5	1.5	1.7	3.2
ELECTRICAL POWER	6.6	1.8	6.4	10.4	15.0	25.5
COMMUNICATIONS	.8	.4	1.2	1.9	2.6	4.6
DATA HANDLING	13.4	1.1	14.5	23.8	6.5	30.2
STABILITY AND CONTROL	4.5	1.9	6.4	10.5	8.2	18.7
AUXILIARY PROPULSION	1.3	.7	2.0	3.1	3.6	6.6
SPACECRAFT MISSION EQUIPMENT	36.8	8.8	45.6 85.6	63.8	47.7	111.5 240.4
SATELLITE QUALIFICATION UNIT(S)			131.2			352.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.9			
CONTRACTOR FEE			3.4			3.6 8.1
TOTAL SATELLITE			137.4			363.6
AVERAGE UNIT COST (6 SATELLITES)						60.6
TOTAL SATELLITE DDT+F AND RECURRING COST						501.1

CO2-1-1 OP SEASAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	88611.	35443.	43411.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511628.	508286.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40718.	37973.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1990132.	139061.	243439.	775276.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	469251.	305686.
403	COMMND DECOD+DISTR	1	2.3	7.5	1.00	5417737.	47819.	46506.	1250173.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
227	ANTENNA	4	.6	0.0	1.00	66452.	85474.	22245.	40657.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	70886.	39543.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	72585.	40928.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	44725.	11327.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

VII-229

CO2-1-1 OP SEASAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.5	0.0	.10	86935.	49360.	173098.	147314.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	231.3	1.00	1354697.	354170.	688971.	312604.
WIRING HARNESS	166.4	1.00	627717.	369275.	380439.	144849.
THERMAL CONTROL	131.3	1.00	616858.	299287.	204476.	142349.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	54.0	1.00	716641.	419334.	271912.	165369.
STRUCTURE	213.0	1.00	3976169.	1035785.	503731.	917529.
POWER CONTROL UNITS	180.3	1.00	1810706.	535359.	520720.	417830.
SOLAR ARRAY DRIVE	38.4	1.00	1185065.	650970.	633170.	273460.
SATELLITE ADAPTER	121.0	1.00	226081.	113753.	49804.	52169.

PROPELLANT WEIGHT 100.0

MISSION EQUIP WEIGHT 1950.0

TOTAL SATELLITE WEIGHT 3513.4

VII-230

**** SATELLITE SYSTEMS COST MODEL ****

C03-1-1 G0VT LE0 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0
BOL POWER = 1619. ARFAY AREA = 131.0 SQ FT BATT CAP = 40. AMP-HR

VII-231

SPACECRAFT COST MODEL

CO3-1-1 GOVT LEO

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	1.4	6.1	15.8	16.1	31.9
THERMAL CONTROL	3.8	1.2	5.0	2.6	2.2	4.8
ELECTRICAL POWER	3.6	1.0	4.6	13.7	23.2	36.9
COMMUNICATIONS	3.8	1.4	5.2	3.9	7.0	11.0
DATA HANDLING	6.4	1.1	7.5	27.6	18.7	46.3
STABILITY AND CONTROL	4.3	1.6	5.9	18.3	18.1	36.4
AUXILIARY PROPULSION	1.4	.8	2.1	8.1	11.3	19.4
SPACECRAFT MISSION EQUIPMENT	21.8	6.4	28.2 34.0	90.0	96.7	186.7 233.1
SATELLITE QUALIFICATION UNIT(S)			62.2			419.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			9.8 13.8
TOTAL SATELLITE			66.3			443.4
AVERAGE UNIT COST (21 SATELLITES)						21.1
TOTAL SATELLITE DDT+E AND RECURRING COST						509.7

VII-232

27

CO3-1-1 GOVT LEO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	29298.	27208.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	24286.	14979.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	235046.	188658.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	319192.	281995.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	95283.	73683.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	37258.	28524.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	818497.	139061.	201230.	199846.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	387888.	180244.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2436508.	47819.	38443.	391930.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	22701.	7178.
227	ANTENNA	4	.6	0.0	1.00	66452.	85474.	18388.	23973.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	58596.	24784.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	60330.	25652.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	25164.	12427.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	36971.	6825.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	13814.	9235.

VII-233

CO3-1-1 GOVT LEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28719.	92155.	52441.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. CO
SOLAR ARRAY	91.5	1.00	706538.	150059.	241297.	11365
WIPING HARNESS	68.7	1.00	296459.	174402.	148521.	4768
THERMAL CONTROL	32.4	1.00	451414.	115892.	74547.	7261
POWER CONVERTERS	0.0	0.00	0.	0.	0.	
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	246732.	12567
STRUCTURE	133.5	1.00	2017332.	696316.	279922.	32450
POWER CONTROL UNITS	95.4	1.00	1052628.	368913.	296609.	16932
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	235406.	10078
SATELLITE ADAPTER	50.0	1.00	106665.	46247.	24549.	1715

PROPELLANT WEIGHT 82.0

MISSION EQUIP WEIGHT 490.0

TOTAL SATELLITE WEIGHT 1352.2

VII-234

**** SATELLITE SYSTEMS COST MODEL ****

CØ3-1-2 PVT LEON ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (OTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS, PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0
BOL POWER = 1619. ARRAY AREA = 131.0 SQ FT BATT CAP = 40. AMP-HR

VII-235

SPACECRAFT COST MODEL

CO3-1-2 PVT LEO

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	1.4	6.1	4.5	3.9	8.4
THERMAL CONTROL	.8	.2	.9	.7	.5	1.3
ELECTRICAL POWER	3.6	1.0	4.6	3.9	5.6	9.5
COMMUNICATIONS	.8	.4	1.2	1.3	1.7	3.0
DATA HANDLING	6.4	1.1	7.4	8.8	4.6	13.4
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.4	.8	2.1	2.3	2.6	4.9
SPACECRAFT	21.8	6.4	28.2	27.3	23.5	50.8
MISSION EQUIPMENT			34.0			57.6
SATELLITE			62.2			108.3
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.9			
LAUNCH SITE SUPPORT						1.9
CONTRACTOR FEE			2.1			3.7
TOTAL SATELLITE			66.3			113.9
AVERAGE UNIT COST (4 SATELLITES)						28.5
TOTAL SATELLITE DDT+E AND RECURRING COST						180.2

VI-236

CD3-1-2 PVT LEO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	818497.	139061.	258914.	356366.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	499081.	354372.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2436508.	47819.	49463.	584056.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	23659.	47132.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	75393.	44195.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	77625.	45744.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VII-237

CO3-1-2 PVT LEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28719.	102587.	74157.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SCLAR ARRAY	91.5	1.00	706538.	150059.	310468.	169364
WIRING HARNESS	68.7	1.00	296459.	174402.	191096.	71064
THERMAL CONTROL	32.4	1.00	451414.	115892.	95916.	108208
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	317451.	187282
STRUCTURE	133.5	1.00	2017332.	696316.	360165.	483575
POWER CONTROL UNITS	95.4	1.00	1052628.	368913.	381635.	252326
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	302888.	150190
SATELLITE ADAPTER	50.0	1.00	106665.	46247.	31587.	25569
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	490.0					

TOTAL SATELLITE WEIGHT 1352.2

VII-238

**** SATELLITE SYSTEMS COST MODEL ****
C03-1-3 G0VT REQ ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 988. ARRAY AREA = 78.0 SQ FT BATT CAP = 100. AMP-HR

V11-239

SPACECRAFT COST MODEL

C03-1-3 GOVT GEO

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.5	1.6	6.1	1.8	2.2	4.0
THERMAL CONTROL	1.8	.2	1.9	.7	.3	1.0
ELECTRICAL POWER	3.0	1.1	4.0	1.7	3.2	4.9
COMMUNICATIONS	1.6	.6	2.2	1.5	1.7	3.2
DATA HANDLING	6.6	1.1	7.7	8.3	3.3	11.7
STABILITY AND CONTROL	4.5	1.9	6.4	4.4	3.3	7.6
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	23.5	7.3	30.9 24.1	19.6	15.7	35.3 20.8
SATELLITE QUALIFICATION UNIT(S)			54.9 0.0			56.1
GSE (AGE)			2.1			
LAUNCH SITE SUPPORT						1.1
CONTRACTOR FEE			2.3			2.5
TOTAL SATELLITE			59.3			59.7
AVERAGE UNIT COST (2 SATELLITES)						29.8
TOTAL SATELLITE DDT+E AND RECURRING CUST						119.0

072-111

CO3-1-3 GOVT GEO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	981361.	139061.	517828.	854552.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	554533.	435072.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	2430551.	47819.	98925.	1165256.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	58418.	23799.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	122761.	186417.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	129374.	75554.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	35547.	30619.

111-241

CO3-1-3 GOVT GEO

ELECTRICAL POWER		UNIT	UNIT	DDTE					
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.0	0.0	.10	86935.	49112.	179297.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	54.0	1.00	491487.	92084.	211687.	98191.
WIRING HARNESS	90.0	1.00	372755.	219285.	266973.	74471.
THERMAL CONTROL	32.0	1.00	1048090.	114920.	105802.	20940.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS.	74.0	1.00	880800.	533631.	408913.	175971.
STRUCTURE	182.0	1.00	2111445.	906166.	520786.	42185.
POWER CONTROL UNITS	120.0	1.00	788494.	421899.	484943.	15753.
SOLAR ARRAY DRIVE	9.0	1.00	443141.	189664.	218005.	8853.
SATELLITE ADAPTER	54.0	1.00	113876.	50568.	36712.	2275.
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					

TOTAL SATELLITE WEIGHT 1486.0

VII-242

**** SATELLITE SYSTEMS COST MODEL ****
C03-1-4 TVT GE9

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL.

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU).

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 988. ARRAY AREA = 78.0 SQ FT BATT CAP = 100. AMP-HR

VII-243

SPACECRAFT COST MODEL

CO3-1-4 PVT GEO

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DOT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.5	1.6	6.1	1.8	2.2	4.0
THERMAL CONTROL	1.8	.2	1.9	.7	.3	1.0
ELECTRICAL POWER	3.0	1.1	4.0	1.7	3.2	4.9
COMMUNICATIONS	1.6	.6	2.2	1.5	1.7	3.2
DATA HANDLING	6.6	1.1	7.7	8.3	3.3	11.7
STABILITY AND CONTROL	4.5	1.9	6.4	4.4	3.3	7.6
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	23.5	7.3	30.9 24.1	19.6	15.7	35.3 20.8
SATELLITE QUALIFICATION UNIT(S)			54.9			56.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			
CONTRACTOR FEE			2.3			1.1 2.5
TOTAL SATELLITE			59.3			59.7
AVERAGE UNIT COST (2 SATELLITES)						29.8
TOTAL SATELLITE DOT+E AND RECURRING COST						119.0

CO3-1-4 PVT GEO

*** ASSEMBLY DESCRIPTIONS ***

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	981361.	139061.	517828.	854552.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	554533.	435072.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	2430551.	47819.	98925.	1165256.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	58418.	23799.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	122761.	186417.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	129374.	75554.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15382.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	35547.	30619.

VI-245

CO3-1-4 PVT GEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.0	0.0	.10	86935.	49112.	179297.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. CO
SOLAR ARRAY	54.0	1.00	491487.	92084.	211687.	9819
WIRING HARNESS	90.0	1.00	372755.	219285.	266973.	7447
THERMAL CONTROL	32.0	1.00	1048090.	114920.	105802.	20940
POWER CONVERTERS	0.0	0.00	0.	0.	0.	
PROPULSION FEED SYS	74.0	1.00	880800.	533631.	408913.	17597
STRUCTURE	182.0	1.00	2111445.	906166.	520786.	42185
POWER CONTROL UNITS	120.0	1.00	788494.	421899.	484943.	15753
SOLAR ARRAY DRIVE	9.0	1.00	443141.	189664.	218005.	8853
SATELLITE ADAPTER	54.0	1.00	113876.	50568.	36712.	2275
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					
TOTAL SATELLITE WEIGHT 1486.0						

VII-246

** SATELLITE SYSTEMS COST MODEL **

CP 3-2-1 SP4T-1 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APCGEE = 450. NUMBER OF QUAL UNITS = 0
BOL POWER = 1539. ARRAY AREA = 125.0 SQ FT BATT CAP = 40. AMP-HR

✓11-247

SPACECRAFT COST MODEL

CO3-2-1 SPOT-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.6	1.4	6.0	1.8	2.1	4.0
THERMAL CONTROL	.8	.2	.9	.3	.3	.6
ELECTRICAL POWER	3.5	1.0	4.4	1.6	3.0	4.6
COMMUNICATIONS	.8	.4	1.2	.7	1.0	1.7
DATA HANDLING	6.3	1.1	7.4	4.4	2.5	7.0
STABILITY AND CONTROL	4.3	1.6	5.9	3.0	2.5	5.4
AUXILIARY PROPULSION	.9	1.1	2.0	2.1	2.2	4.4
SPACECRAFT MISSION EQUIPMENT	21.1	6.6	27.8 33.4	14.0	13.6	27.7 31.2
SATELLITE QUALIFICATION UNIT(S)			61.1			58.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			1.0 2.0
TOTAL SATELLITE			65.1			61.9
AVERAGE UNIT COST (2 SATELLITES)						30.9
TOTAL SATELLITE DDT+E AND RECURRING COST						127.0

C03-2-1 SPOT-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	336026.	234322.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
618	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	44	.7	.1	.10	34577.	231762.	323864.	419216.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	806736.	139061.	287682.	386766.
345	TAPE RECORDER	4	16.6	25.0	1.00	499633.	583549.	554533.	435072.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2404996.	47819.	54958.	480502.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	83769.	48664.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-249

CD3-2-1 SPDT-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28689.	104736.	76699.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. CC
SOLAR ARRAY	87.0	1.00	683727.	143212.	329224.	13660
WIRING HARNESS	67.3	1.00	291328.	171384.	208654.	5820
THERMAL CONTROL	32.0	1.00	446289.	114920.	105802.	8916
POWER CONVERTERS	C.W	0.00	0.	0.	0.	
PROPULSION FEED SYS	61.0	1.00	490334.	460316.	352733.	9796
STRUCTURE	132.0	1.00	1992213.	689660.	396357.	39803
POWER CONTROL UNITS	91.0	1.00	1021860.	358861.	412485.	20416
SOLAR ARRAY DRIVE	14.4	1.00	609446.	282805.	325064.	12176
SATELLITE ADAPTER	49.0	1.00	104849.	45482.	34684.	2094
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	480.0					
TOTAL SATELLITE WEIGHT	1328.3					

VII-250

**** SATELLITE SYSTEMS COST MODEL ****
C03-2-2 SP0T-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 450. NUMBER OF QUAL UNITS = 0
BOL POWER = 1619. ARRAY AREA = 131.0 SQ FT BATT CAP = 40. AHP-HR

VII-251

SPACECRAFT COST MODEL

CO3-2-2 SPOT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	1.4	6.1	1.9	2.2	4.1
THERMAL CONTROL	.8	.2	.9	.3	.3	.6
ELECTRICAL POWER	3.6	1.0	4.6	1.7	3.1	4.8
COMMUNICATIONS	.8	.4	1.2	.7	1.0	1.7
DATA HANDLING	6.4	1.1	7.4	4.5	2.5	7.0
STABILITY AND CONTROL	4.3	1.6	5.9	3.0	2.5	5.4
AUXILIARY PROPULSION	1.4	.8	2.1	1.1	1.4	2.5
SPACECRAFT MISSION EQUIPMENT	21.8	6.4	28.2 34.0	13.0	13.0	26.0 32.0
SATELLITE QUALIFICATION UNIT(S)			62.2			58.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			1.9
TOTAL SATELLITE			66.3			60.8
AVERAGE UNIT COST - (2 SATELLITES)						30.4
TOTAL SATELLITE DDT+E AND RECURRING COST						127.1

CO3-2-2 SPOT-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1615	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	336026.	234322.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
618	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42390.	43351.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	818497.	139061.	287682.	392404.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	554533.	435072.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2436508.	47819.	54958.	486797.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	83769.	48664.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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CO3-2-2 SPOT-2

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28719.	104848.	79699.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	91.5	1.00	706538.	150059.	344963.	14116.
WIRING HARNESS	68.7	1.00	296459.	174402.	212329.	5923.
THERMAL CONTROL	32.4	1.00	451414.	115892.	106573.	9018.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	352733.	15609.
STRUCTURE	133.5	1.00	2017332.	696316.	400182.	40304.
POWER CONTROL UNITS	95.4	1.00	1052628.	368913.	424038.	21030.
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	336542.	12518.
SATELLITE ADAPTER	50.0	1.00	106665.	46247.	35096.	2131.
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	490.0					

TOTAL SATELLITE WEIGHT 1352.2

11-854

**** SATELLITE SYSTEMS COST MODEL ****

C43-2-3 ETS-3 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 450. NUMBER OF QUAL UNITS = 0
BOL POWER = 982. ARRAY AREA = 80.0 SQ FT BATT CAP = 24. AMP-HR

VII-255-

SPACECRAFT COST MODEL

CO3-2-3 ETS-3

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.8	.9	3.7	0.0	.8	.8
THERMAL CONTROL	.6	.1	.7	0.0	.1	.1
ELECTRICAL POWER	2.5	.7	3.2	.1	1.1	1.2
COMMUNICATIONS	.8	.4	1.2	.3	.5	.8
DATA HANDLING	3.6	1.1	4.7	.8	1.2	2.0
STABILITY AND CONTROL	4.3	1.6	5.9	.9	1.4	2.3
AUXILIARY PROPULSION	1.1	.6	1.6	.2	.6	.8
SPACECRAFT MISSION EQUIPMENT	15.7	5.4	21.1 7.8	2.3	5.8	8.1 3.1
SATELLITE QUALIFICATION UNIT(S)			28.9 0.0			11.2
GSE (AGE)			1.5			
LAUNCH SITE SUPPORT						.4
CONTRACTOR FEE			1.6			.6
TOTAL SATELLITE			32.0			12.2
AVERAGE UNIT COST (1 SATELLITES)						12.2
TOTAL SATELLITE DDT+E AND RECURRING COST						44.2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	359910.	139061.	177581.	0.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	616146.	479069.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1280799.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	29209.	63717.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	93077.	40561.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	95838.	41982.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-257

CO3-2-3 ETS-3

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	19.9	0.0	.10	27169.	19619.	72535.	54827.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.5	1.00	500275.	94450.	241251.	0.
WIRING HARNESS	37.5	1.00	177421.	104374.	141190.	0.
THERMAL CONTROL	22.0	1.00	357468.	89139.	94418.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	41.0	1.00	609921.	339671.	289205.	0.
STRUCTURE	84.0	1.00	1141339.	469661.	299911.	0.
POWER CONTROL UNITS	57.3	1.00	785689.	273784.	349660.	0.
SOLAR ARRAY DRIVE	9.2	1.00	449794.	193241.	246796.	0.
SATELLITE ADAPTER	22.4	1.00	35935.	21920.	24379.	0.

PROPELLANT WEIGHT 22.0

MISSION EQUIP WEIGHT 55.0

TOTAL SATELLITE WEIGHT 610.9

VII-258

**** SATELLITE SYSTEMS COST MODEL ****
C03-2-4 EARTH OBS ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 450. NUMBER OF QUAL UNITS = 0
BOL POWER = 1472. ARRAY AREA = 120.0 SQ FT BATT CAP = 36. AMP-HR

VII-259

SPACECRAFT COST MODEL

CJ3-2-4 EARTH OBS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.3	5.7	5.2	4.3	9.5
THERMAL CONTROL	.7	.2	.8	.8	.6	1.4
ELECTRICAL POWER	3.3	.8	4.1	4.4	5.8	10.2
COMMUNICATIONS	.8	.4	1.2	1.6	2.1	3.6
DATA HANDLING	6.0	1.1	7.1	9.5	4.8	14.3
STABILITY AND CONTROL	4.2	1.6	5.8	6.8	5.3	12.1
AUXILIARY PROPULSION	1.4	.7	2.1	2.5	2.9	5.4
SPACECRAFT						
MISSION EQUIPMENT	20.8	6.0	26.8	30.8	25.8	56.6
			33.5			67.4
SATELLITE						
QUALIFICATION UNIT(S)			60.3			124.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.0			2.2
						4.1
TOTAL SATELLITE			64.2			130.3
AVERAGE UNIT COST (5 SATELLITES)						26.1
TOTAL SATELLITE DDT+E AND RECURRING COST						194.5

VII-266

701

CO3-2-4 EARTH OBS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	20244.	23694.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	30206.	25213.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	292339.	277428.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	396995.	474668.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	74492.	68214.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41081.	39090.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	758879.	139061.	250280.	311887.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	378000.	271682.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2276289.	47819.	47813.	538448.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	28235.	10555.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	22870.	43534.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	72878.	41718.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	75036.	43179.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	31298.	18275.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	45982.	12067.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17181.	13580.

192-117

CO3-2-4 EARTH OBS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	31.5	0.0	.10	37808.	27357.	96789.	65951.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	83.0	1.00	664466.	137104.	274206.	157177
WIRING HARNESS	55.0	1.00	245501.	144424.	152971.	58072
THERMAL CONTROL	30.0	1.00	389820.	110000.	88636.	92210
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	58.0	1.00	775895.	442895.	295260.	183535
STRUCTURE	112.0	1.00	1906205.	599767.	299880.	450906
POWER CONTROL UNITS	66.0	1.00	995615.	297386.	297383.	235509
SOLAR ARRAY DRIVE	14.0	1.00	597916.	276114.	276111.	141435
SATELLITE ADAPTER	45.0	1.00	97528.	42391.	28708.	23070
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	480.0					
TOTAL SATELLITE WEIGHT 1232.0						

VII-262

**** SATELLITE SYSTEMS COST MODEL ****
C03-2-5 ESA GEP V

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 928. ARRAY AREA = 73.0 SQ FT BATT CAP = 80. AMP-HR

VII-263

SPACECRAFT COST MODEL

CO3-2-5 ESA-GEO

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.2	1.4	5.6	1.7	2.0	3.7
THERMAL CONTROL	1.4	.2	1.6	.6	.3	.9
ELECTRICAL POWER	2.7	.9	3.6	1.5	2.8	4.3
COMMUNICATIONS	1.5	.6	2.2	1.4	1.6	3.0
DATA HANDLING	5.8	1.1	6.8	3.8	2.2	6.0
STABILITY AND CONTROL	4.5	1.9	6.4	4.3	3.2	7.5
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	21.7	6.9	28.6 23.9	14.5	13.7	28.1 20.9
SATELLITE QUALIFICATION UNIT(S)			52.5			49.0
GSE (AGE)			0.0 1.9			
LAUNCH SITE SUPPORT						1.0
CONTRACTOR FEE			2.1			2.0
TOTAL SATELLITE			56.5			52.0
AVERAGE UNIT COST (2 SATELLITES)						26.0
TOTAL SATELLITE DDT+E AND RECURRING COST						108.6

VII-264

240

CO3-2-5 ESA-GEO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	719509.	139061.	287682.	344947.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	434489.	345879.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2169794.	47819.	54958.	433509.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	122761.	186417.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	129374.	75554.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-265

CO3-2-5 ESA-GEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
266	BATTERY	2	55.5	0.0	.10	72479.	41131.	150161.	140215.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COS
SOLAR ARRAY	51.0	1.00	469215.	87336.	200774.	93746
WIRING HARNESS	68.0	1.00	293896.	172894.	210493.	58718
THERMAL CONTROL	31.0	1.00	847697.	112473.	103855.	169364
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	74.0	1.00	880800.	533631.	408913.	175978
STRUCTURE	156.0	1.00	1947352.	794883.	456830.	389067
POWER CONTROL UNITS	90.0	1.00	760118.	356549.	409828.	151866
SOLAR ARRAY DRIVE	8.4	1.00	422889.	178862.	205588.	84490
SATELLITE ADAPTER	48.0	1.00	103027.	45018.	34268.	20584
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					

TOTAL SATELLITE WEIGHT 1313.4

998-118

**** SATELLITE SYSTEMS COST MODEL ****
C03-2-6 OTHER GEP

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 988. ARRAY AREA = 78.0 SQ FT BATT CAP = 100. AMP-HR

VII-267

SPACECRAFT COST MODEL

CD3-2-6 OTHER GEO

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.5	1.6	6.1	0.0	1.2	1.2
THERMAL CONTROL	1.8	.2	1.9	0.0	.2	.2
ELECTRICAL POWER	3.0	1.1	4.0	.3	1.8	2.1
COMMUNICATIONS	1.6	.6	2.2	.6	.9	1.6
DATA HANDLING	6.6	1.1	7.7	4.1	1.8	5.9
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	1.5	.9	2.4	.3	.9	1.2
SPACECRAFT MISSION EQUIPMENT	23.5	7.3	30.9 24.1	7.1	8.7	15.8 11.5
SATELLITE QUALIFICATION UNIT(S)			54.9 0.0			27.3
GSE (AGE)			2.1			
LAUNCH SITE SUPPORT						
CONTRACTOR FEE			2.3			1.1
TOTAL SATELLITE			59.3			29.0
AVERAGE UNIT COST (1 SATELLITES)						29.0
TOTAL SATELLITE DDT+E AND RECURRING COST						88.3

29.4

CO3-2-6 OTHER GEO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	981361.	139061.	575364.	940969.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	616146.	479069.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	2430551.	47819.	109917.	971214.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	136401.	155374.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	143749.	62973.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	39496.	25521.

692-111

CO3-2-6, OTHER GEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.0	0.0	.10	86935.	49112.1	181579.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	54.0	1.00	491487.	92084.	235207.	0.
WIRING HARNESS	90.0	1.00	372755.	219285.	296636.	0.
THERMAL CONTROL	32.0	1.00	1048090.	114920.	117557.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.0	1.00	880800.	533631.	454347.	0.
STRUCTURE	182.0	1.00	2111445.	906166.	578650.	0.
POWER CONTROL UNITS	120.0	1.00	788494.	421899.	538824.	0.
SOLAR ARRAY DRIVE	9.0	1.00	443141.	189664.	242228.	0.
SATELLITE ADAPTER	54.0	1.00	113876.	50568.	40791.	0.
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					

TOTAL SATELLITE WEIGHT 1486.0

VII-276

**** SATELLITE SYSTEMS COST MODEL ****
C04-1-2 TIR08-2 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 450. NUMBER OF QUAL UNITS = 0
BOL POWER = 1204. ARRAY AREA = 98.0 SQ FT BATT CAP = 24. AMP-HR

VII-271

SPACECRAFT COST MODEL

CO4-1-2 TIROS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.2	5.6	7.7	5.9	13.6
THERMAL CONTROL	.7	.2	.8	1.2	.9	2.1
ELECTRICAL POWER	3.0	.8	3.8	5.7	7.9	13.6
COMMUNICATIONS	.6	.3	.9	1.7	2.7	4.5
DATA HANDLING	7.6	1.6	9.1	15.6	7.9	23.5
STABILITY AND CONTROL	4.5	1.9	6.4	12.7	10.5	23.2
AUXILIARY PROPULSION	1.4	.8	2.1	4.1	4.9	8.9
SPACECRAFT MISSION EQUIPMENT	22.1	6.6	28.8	48.7	40.6	89.3
			36.4			111.6
SATELLITE QUALIFICATION UNIT(S)			65.2			200.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.2			3.7
						6.5
TOTAL SATELLITE			69.3			211.1
AVERAGE UNIT COST (8 SATELLITES)						26.4
TOTAL SATELLITE DDT+E AND RECURRING COST						280.4

CO4-1-2 TIROS-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	33927.	39518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	28124.	21756.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	489929.	462713.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	369623.	409584.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	102475.	93105.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40070.	36043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	GEN PURP PROCESR	2	12.8	15.0	1.00	740925.	226440.	223202.	262756.
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	726597.	139061.	129457.	158177.
348	TAPE RECORDER	2	21.5	10.2	1.00	577156.	709956.	294850.	204678.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2409294.	47819.	44516.	524493.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	47319.	17605.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	11830.	19602.
303	TRANSMITTER	2	2.2	10.2	1.00	105063.	49590.	69862.	37259.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	52453.	30480.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	42812.	10183.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15996.	12498.

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27-7

CO4-1-2 TIROS-2

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
IDENT	TYPE								
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	80626.	43698.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	68.0	1.00	576639.	113996.	212269.	125532.
WIRING HARNESS	61.0	1.00	268031.	157678.	155495.	58349.
THERMAL CONTROL	30.3	1.00	398683.	110744.	83006.	86791.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	285715.	170083.
STRUCTURE	110.0	1.00	1979597.	590651.	274960.	430950.
POWER CONTROL UNITS	53.4	1.00	885181.	262724.	244606.	192700.
SOLAR ARRAY DRIVE	11.3	1.00	517074.	230142.	214272.	112565.
SATELLITE ADAPTER	47.0	1.00	101200.	44389.	27417.	22031.
PROPELLANT WEIGHT	88.0					
MISSION EQUIP WEIGHT	540.0					

TOTAL SATELLITE WEIGHT 1293.6

VII-274

**** SATELLITE SYSTEMS COST MODEL ****

CBA-1-3 NAAA ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0

BOL POWER = 1521. ARRAY AREA = 123.0 SQ FT BATT CAP = 28. AMP-HR

VII-275

SPACECRAFT COST MODEL

CO4-1-3 NOAA

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST-AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.8	1.3	6.1	8.4	6.5	14.8
THERMAL CONTROL	.7	.2	.9	1.3	1.0	2.2
ELECTRICAL POWER	3.4	.9	4.3	6.5	9.2	15.7
COMMUNICATIONS	.5	.3	.8	1.7	2.7	4.4
DATA HANDLING	8.0	1.6	9.5	16.3	7.9	24.2
STABILITY AND CONTROL	4.5	1.9	6.4	12.7	10.5	23.2
AUXILIARY PROPULSION	1.4	.8	2.1	4.1	4.9	8.9
SPACECRAFT MISSION EQUIPMENT	23.3	6.8	30.1	50.9	42.5	93.4
			49.4			121.1
SATELLITE QUALIFICATION UNIT(S)			79.6			214.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.3			3.8
						6.8
TOTAL SATELLITE			83.9			225.2
AVERAGE UNIT COST (8 SATELLITES)						28.2
TOTAL SATELLITE DDT+E AND RECURRING COST						309.1

VII-276

251

CO4-1-3 NOAA

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	33927.	39518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	28124.	21756.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	489929.	462713.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	369623.	409584.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	102475.	93105.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40070.	36043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	GEN PURP PROCESR	2	12.8	15.0	1.00	740925.	226440.	223202.	262756.
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	785894.	139061.	129457.	171086.
348	TAPE RECORDER	2	21.5	10.2	1.00	577156.	709956.	294850.	204678.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2585433.	47819.	44516.	562838.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	47319.	17605.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	11830.	19602.
303	TRANSMITTER	2	2.2	10.2	1.00	105063.	49590.	69862.	37259.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	52453.	30480.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	42812.	10183.
603	DIPLEXER	1	3.1	1.0	0.00	0.	0.	13407.	9234.

VII-277

CO4-1-3 NOAA

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.0	0.0	.10	30806.	25775.	88952.	49548.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	86.0	1.00	676051.	141687.	263833.	147173
WIRING HARNESS	66.0	1.00	286549.	168572.	166238.	62381
THERMAL CONTROL	33.0	1.00	423858.	117343.	87256.	92272
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	285715.	170083
STRUCTURE	111.4	1.00	2111445.	597035.	277932.	459652
POWER CONTROL UNITS	70.0	1.00	1014872.	307801.	286575.	220933
SOLAR ARRAY DRIVE	14.3	1.00	606573.	281135.	261748.	132048
SATELLITE ADAPTER	51.3	1.00	109018.	48221.	28858.	23733
PROPELLANT WEIGHT	88.0					
MISSION EQUIP WEIGHT	600.0					

TOTAL SATELLITE WEIGHT 1412.7

VII-278

**** SATELLITE SYSTEMS COST MODEL ****
CDA-2-2 METEORATE V

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 460. ARRAY AREA = 142.0 SQ FT BATT CAP = 28. AMP-HR

SPACECRAFT COST MODEL

CO4-2-2 METEOSAT2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	2.1	5.4	3.1	4.6	7.7
THERMAL CONTROL	1.2	.2	1.3	1.1	.6	1.7
ELECTRICAL POWER	3.7	1.4	5.1	3.9	5.9	9.8
COMMUNICATIONS	1.5	.6	2.1	2.4	2.6	5.0
DATA HANDLING	5.3	1.1	6.4	7.1	4.0	11.1
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	19.8	7.4	27.2 23.9	24.9	23.7	48.6 37.6
SATELLITE QUALIFICATION UNIT(S)			51.1			86.2
GSE (AGE)			0.0 1.8			
LAUNCH SITE SUPPORT						1.8
CONTRACTOR FEE			2.0			3.5
TOTAL SATELLITE			54.9			91.5
AVERAGE UNIT COST (4 SATELLITES)						22.9
TOTAL SATELLITE DDT+E AND RECURRING COST						146.4

082-11A

CO4-2-2 METEOSAT2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	650067.	139061.	258914.	283033.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1980496.	47819.	49463.	474745.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VII-281

CO4-2-2 METEOSAT2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.0	0.0	.10	30806.	25775.	92072.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	70.0	1.00	747562.	117097.	242271.	179198.
WIRING HARNESS	72.0	1.00	308492.	181481.	198853.	73949.
THERMAL CONTROL	36.0	1.00	682986.	124474.	102014.	163719.
POWER CONVERTERS	16.0	1.00	592909.	369370.	191054.	142126.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	325.4	1.00	1793644.	1484916.	768063.	429955.
POWER CONTROL UNITS	71.0	1.00	504172.	310366.	321069.	120855.
SATELLITE ADAPTER	58.0	1.00	121007.	46444.	34452.	29007.

PROPELLANT WEIGHT 155.0

MISSION EQUIP WEIGHT 290.0

TOTAL SATELLITE WEIGHT 1366.1

VII-282

**** SATELLITE SYSTEMS COST MODEL ****
CP4-2-4 GMS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 811. ARRAY AREA = 64.0 SQ FT BATT CAP = 72. AMP-HR

VII-283

SPACECRAFT COST MODEL

CD4-2-4 GMS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.3	5.8	4.2	3.3	7.6
THERMAL CONTROL	1.3	.1	1.5	1.3	.5	1.8
ELECTRICAL POWER	2.5	.8	3.3	3.1	4.5	7.6
COMMUNICATIONS	1.5	.6	2.2	2.6	2.8	5.4
DATA HANDLING	6.4	1.1	7.4	8.4	4.0	12.3
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.5	.9	2.4	2.5	3.0	5.5
SPACECRAFT MISSION EQUIPMENT	22.0	6.5	28.4 33.7	27.9	22.6	50.5 56.7
SATELLITE QUALIFICATION UNIT(S)			62.1			107.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.1			1.9 3.7
TOTAL SATELLITE			66.2			112.7
AVERAGE UNIT COST (4 SATELLITES)						28.2
TOTAL SATELLITE DDT+E AND RECURRING COST						179.0

482-111

260

CD4-2-4 GMS-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	817524.	139061.	258914.	355943.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2433903.	47819.	49463.	583431.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	58281.	37421.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VII-285

CO4-2-4 GMS-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.3	0.0	.10	66515.	37768.	134911.	119728.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	44.3	1.00	427929.	76658.	158603.	102579.
WIRING HARNESS	66.5	1.00	288389.	169654.	185894.	69130.
THERMAL CONTROL	29.0	1.00	773830.	107500.	89893.	185495.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.3	1.00	883267.	535285.	369164.	211728.
STRUCTURE	146.0	1.00	2103536.	751358.	388635.	504239.
POWER CONTROL UNITS	67.0	1.00	702494.	300014.	310361.	168395.
SOLAR ARRAY DRIVE	7.4	1.00	388065.	160593.	166131.	93023.
SATELLITE ADAPTER	53.0	1.00	112081.	49143.	32682.	26867.
PROPELLANT WEIGHT	205.0					
MISSION EQUIP WEIGHT	485.0					

TOTAL SATELLITE WEIGHT 1442.1

VII-286

**** SATELLITE SYSTEMS COST MODEL ****
C04-2-5 OTHER

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0

BOL POWER = 811. ARRAY AREA = 54.0 SQ FT BATT CAP = 72. AMP-HR

VII-287

SPACECRAFT COST MODEL

C04-2-5 OTHER

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.3	5.8	5.2	4.0	9.3
THERMAL CONTROL	1.3	.1	1.5	1.6	.6	2.2
ELECTRICAL POWER	2.5	.8	3.3	3.8	5.4	9.3
COMMUNICATIONS	1.5	.6	2.2	3.0	3.4	6.4
DATA HANDLING	6.4	1.1	7.4	10.1	4.8	14.9
STABILITY AND CONTROL	4.3	1.6	5.9	7.0	5.4	12.4
AUXILIARY PROPULSION	1.5	.9	2.4	3.1	3.7	6.8
SPACECRAFT MISSION EQUIPMENT	22.0	6.5	28.4	33.8	27.3	61.1
			33.7			68.5
SATELLITE QUALIFICATION UNIT(S)			62.1			
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			129.6
CONTRACTOR FEE			2.1			2.3
TOTAL SATELLITE						4.4
			66.2			
AVERAGE UNIT COST (5 SATELLITES)						136.4
TOTAL SATELLITE DDT+E AND RECURRING COST						- 27.3
						202.6

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C04-2-5 OTHER

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	36439.	45798.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	30206.	25213.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	292339.	277428.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	396995.	474668.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	105059.	100975.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	57938.	52396.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	817524.	139061.	250280.	335989.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	378000.	271682.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2433903.	47819.	47813.	575731.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	28235.	10555.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	106800.	159806.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	109318.	62576.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	112554.	64769.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	56337.	35323.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	45982.	12067.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17181.	13580.

V11-289

265

C04-2-5 OTHER

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.3	0.0	.10	66515.	37768.	133627.	116028.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	44.3	1.00	427929.	76658.	153313.	101225.
WIRING HARNESS	66.5	1.00	288389.	169654.	179695.	68217.
THERMAL CONTROL	29.0	1.00	773830.	107500.	86895.	183047.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.3	1.00	883267.	535285.	356852.	208934.
STRUCTURE	146.0	1.00	2103536.	751358.	375675.	497584.
POWER CONTROL UNITS	67.0	1.00	702494.	300014.	300010.	166172.
SOLAR ARRAY DRIVE	7.4	1.00	388065.	160593.	160591.	91795.
SATELLITE ADAPTER	53.0	1.00	112081.	49143.	31592.	26512.
PROPELLANT WEIGHT	205.0					
MISSION EQUIP WEIGHT	485.0					

TOTAL SATELLITE WEIGHT 1442.1

VII-290

200

**** SATELLITE SYSTEMS COST MODEL ****

CC1-1-1 INTLSAT-5

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL. UNITS = 0
BOL POWER = 1443. ARRAY AREA = 446.0 SQ FT BATT CAP = 100. AMP-HR

ORIGINAL PAGE IS
OF POOR QUALITY

152-111
152-291

SPACECRAFT COST MODEL

CC1-1-1 INTLSAT-5

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.1	3.8	8.9	4.9	8.1	13.0
THERMAL CONTROL	1.3	.4	1.7	1.2	1.3	2.5
ELECTRICAL POWER	6.4	1.8	8.1	7.0	9.3	16.3
COMMUNICATIONS	1.5	.6	2.1	2.4	2.7	5.1
DATA HANDLING	7.7	.3	7.9	8.9	1.8	10.7
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.6	.8	2.4	2.1	2.6	4.6
SPACECRAFT MISSION EQUIPMENT	26.9	9.0	35.8 50.3	31.8	29.3	61.1 83.2
SATELLITE QUALIFICATION UNIT(S)			86.1			144.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE			2.7			2.1 4.4
TOTAL SATELLITE			91.1			150.8
AVERAGE UNIT COST (4 SATELLITES)						37.7
TOTAL SATELLITE DOT+E AND RECURRING COST						241.9

VII-292

CG1-1-1 INTL SAT-5

* * * * * ASSEMBLY DESCRIPTIONS * * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	NOTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	54563.	50706.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23042.	25906.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1164826.	139061.	258914.	507155.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3346547.	47819.	49463.	802201.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBNC ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

Y11-293

CG1-1-1 INTLSAT-5

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	91.0	0.0	.10	86935.	58720.	209753.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	219.0	1.00	1665636.	336695.	696613.	399270
WIRING HARNESS	103.0	1.00	417938.	245866.	269401.	100184
THERMAL CONTROL	136.0	1.00	751840.	306509.	221995.	180224
POWER CONVERTERS	16.0	1.00	592909.	369370.	191054.	142126
PROPULSION FEED SYS	75.0	1.00	939021.	539139.	371821.	225093
STRUCTURE	647.0	1.00	2776503.	2663273.	1377561.	665556
POWER CONTROL UNITS	52.0	1.00	984093.	258672.	267593.	235897
SATELLITE ADAPTER	111.0	1.00	210098.	85989.	50364.	50363
PROPELLANT WEIGHT	142.0					
MISSION EQUIP WEIGHT	650.0					

TOTAL SATELLITE WEIGHT 2630.0

**** SATELLITE SYSTEMS COST MODEL ****

CCI-1-2 INTLSAT 5 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APD GEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1443. ARRAY AREA = 446.0 SQ FT BATT CAP = 100. AMP-HR

VII-295

SPACECRAFT COST MODEL

CC1-1-2 INTLSAT-5

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DOT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.1	3.8	8.9	11.2	19.1	30.3
THERMAL CONTROL	1.3	.4	1.7	2.8	3.0	5.8
ELECTRICAL POWER	6.4	1.8	8.1	16.1	22.2	38.3
COMMUNICATIONS	1.5	.6	2.1	5.0	6.3	11.2
DATA HANDLING	7.7	.3	7.9	19.4	4.1	23.5
STABILITY AND CONTROL	3.3	1.3	4.6	10.7	8.7	19.4
AUXILIARY PROPULSION	1.6	.8	2.4	4.7	6.1	10.8
SPACECRAFT MISSION EQUIPMENT	26.9	9.0	35.8 50.3	69.9	69.5	139.4 193.7
SATELLITE QUALIFICATION UNIT(S)			86.1 0.0			333.1
GSE (AGE)			2.3			
LAUNCH SITE SUPPORT						5.7
CONTRACTOR FEE			2.7			10.2
TOTAL SATELLITE			91.1			348.9
AVERAGE UNIT COST (11 SATELLITES)						31.7
TOTAL SATELLITE DOT+E AND RECURRING COST						440.0

VI-296

CC1-1-2 INTLSAT-5

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	17839.	33159.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	12877.	23224.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	11814.	15447.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	362790.	376925.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	150348.	125657.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	51630.	42365.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	21804.	21645.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1164826.	139061.	222012.	368287.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3346547.	47819.	42413.	669142.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	25046.	8922.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	94738.	122940.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	96971.	48141.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	99842.	49827.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	27763.	15447.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	40789.	8979.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15240.	11479.

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CC1-1-2 INTLSAT-5

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	91.0	0.0	.10	86935.	58720.	198481.	130745.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	219.0	1.00	1665636.	336695.	597328.	333044.
WIRING HARNESS	103.0	1.00	417938.	245866.	231005.	83567.
THERMAL CONTROL	136.0	1.00	751840.	306509.	190355.	150331.
POWER CONVERTERS	16.0	1.00	592909.	369370.	163824.	118552.
PROPULSION FEED SYS	75.0	1.00	939021.	539139.	318828.	187757.
STRUCTURE	647.0	1.00	2776503.	2663273.	1181224.	555162.
POWER CONTROL UNITS	52.0	1.00	984093.	258672.	229454.	196770.
SATELLITE ADAPTER	111.0	1.00	210098.	85989.	43186.	42009.
PROPELLANT WEIGHT	142.0					
MISSION EQUIP WEIGHT	850.0					

TOTAL SATELLITE WEIGHT 2630.0

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8.28-11A

** SATELLITE SYSTEMS COST MODEL **

CCI-1-3 INTLSAT 6✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1908. ARRAY AREA = 150.0 SQ FT BATT CAP = 200. AMP-HR

VH-299

SPACECRAFT COST MODEL

CC1-1-3 INTLSAT-6

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.5	10.2	15.8	13.9	29.7
THERMAL CONTROL	2.0	.3	2.4	4.2	2.3	6.5
ELECTRICAL POWER	4.5	1.5	5.9	12.6	18.9	31.5
COMMUNICATIONS	1.4	.5	1.9	3.9	5.5	9.4
DATA HANDLING	9.3	.3	9.6	30.5	4.3	34.8
STABILITY AND CONTROL	4.7	2.4	7.0	17.5	14.9	32.4
AUXILIARY PROPULSION	2.4	1.4	3.8	7.3	10.2	17.5
SPACECRAFT MISSION EQUIPMENT	31.9	8.9	40.8 55.1	91.8	70.0	161.8 207.0
SATELLITE QUALIFICATION UNIT(S)			95.9			368.8
GSE (AGE)			0.0 2.6			
LAUNCH SITE SUPPORT						6.0
CONTRACTOR FEE			3.0			11.7
TOTAL SATELLITE			101.6			386.6
AVERAGE UNIT COST (10 SATELLITES)						38.7
TOTAL SATELLITE DOT+E AND RECURRING COST						488.1

VII-300

CC1-1-3 INTLSAT-6

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	32795.	36502.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	38341.	28404.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	473591.	427393.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1271747.	1058460.	503912.	534744.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	101029.	88918.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	71109.	57920.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1438716.	139061.	225252.	471269.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4046553.	47819.	77457.	1325499.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	64510.	22984.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	53400.	71823.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	160525.	89410.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	50703.	28153.
503	COMMAND SIG COND	4	1.5	.9	1.00	24229.	56157.	52818.	12076.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6473.	4369.

VII-301

CC1-1-3 INTLSAT-6

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	4	71.3	0.0	.10	152945.	81101.	275931.	234936.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.0	1.00	776801.	168950.	304107.	159626.
WIRING HARNESS	137.0	1.00	532310.	313149.	298514.	109386.
THERMAL CONTROL	101.0	1.00	1201663.	250515.	162280.	246932.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	148.0	1.00	1381984.	906836.	544096.	283987.
STRUCTURE	304.0	1.00	3600982.	1401489.	630664.	739973.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	452577.	238122.
SOLAR ARRAY DRIVE	18.0	1.00	708990.	341870.	307680.	145692.
SATELLITE ADAPTER	108.0	1.00	205261.	102959.	43119.	42180.
PROPELLANT WEIGHT	703.0					
MISSION EQUIP WEIGHT	941.0					

TOTAL SATELLITE WEIGHT 3159.0

VII-302

**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-1 TDRS/WSTR ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 977. ARRAY AREA = 76.8 SQ FT BATT CAP = 100. AMP-HR

VII-303

SPACECRAFT COST MODEL

CC2-1-1 TDRS/WSTR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.0	1.6	6.6	11.0	9.4	20.4
THERMAL CONTROL	1.4	.2	1.6	3.1	1.3	4.4
ELECTRICAL POWER	2.8	.9	3.8	8.4	12.8	21.1
COMMUNICATIONS	1.3	.5	1.8	4.0	5.5	9.5
DATA HANDLING	6.1	.3	6.3	13.4	2.6	16.0
STABILITY AND CONTROL	4.5	1.9	6.4	15.6	13.7	29.3
AUXILIARY PROPULSION	1.9	1.1	2.9	6.5	8.5	15.0
SPACECRAFT MISSION EQUIPMENT	23.0	6.4	29.4 37.3	61.8	53.9	115.7 141.0
SATELLITE QUALIFICATION UNIT(S)			66.8			256.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.2			5.2 8.5
TOTAL SATELLITE			71.0			270.3
AVERAGE UNIT COST (11 SATELLITES)						24.6
TOTAL SATELLITE DDT+E AND RECURRING COST						341.3

VII-304

CC2-1-1 TDRS/WSTR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	32324.	35233.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	26795.	19397.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	466779.	412533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	352158.	365166.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	100369.	87057.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	55351.	45174.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	837920.	139061.	123340.	167542.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2738871.	47819.	42413.	547637.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	45083.	15695.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	52632.	69886.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	158216.	86302.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	49974.	27174.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	40789.	8979.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6380.	4217.

VII-305

CC2-1-1 TDRS/WSTR

ELECTRICAL POWER

IDENT TYPE
269 BATTERY

UNIT NO.	WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST
2	71.3	0.0	.10	86935.

T.E. COST
49261.

VEHICLE PROD. COST
166507.

VEHICLE ENG. COST
130745.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	53.4	1.00	485960.	91136.	161683.	97168
WIRING HARNESS	73.7	1.00	314658.	185108.	173919.	62916
THERMAL CONTROL	33.5	1.00	831578.	118545.	83868.	166274
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	391221.	212937
STRUCTURE	183.7	1.00	2373150.	913355.	405095.	474511
POWER CONTROL UNITS	89.9	1.00	783346.	356317.	316070.	156630
SOLAR ARRAY DRIVE	8.9	1.00	439797.	187872.	166651.	87937
SATELLITE ADAPTER	63.3	1.00	130344.	58391.	31092.	26062
PROPELLANT WEIGHT	270.9					
MISSION EQUIP WEIGHT	599.0					

TOTAL SATELLITE WEIGHT 1732.1

VII-306

**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-2 COMSTAR 1 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BDL POWER = 1043. ARRAY AREA = 322.6 SQ FT BATT CAP = 66. AMP-HR

VII-307

SPACECRAFT COST MODEL

CC2-1-2 COMSTAR-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.1	1.8	5.9	0.0	1.2	1.2
THERMAL CONTROL	1.5	.3	1.8	0.0	.3	.3
ELECTRICAL POWER	5.5	1.6	7.1	.2	2.4	2.6
COMMUNICATIONS	.8	.3	1.1	.3	.6	.8
DATA HANDLING	5.3	.4	5.7	2.1	1.1	3.2
STABILITY AND CONTROL	5.2	1.8	7.0	1.1	1.3	2.4
AUXILIARY PROPULSION	1.9	1.0	2.9	.1	.9	1.0
SPACECRAFT	28.2	7.2	31.4	3.9	7.7	11.5
MISSION EQUIPMENT			16.7			8.5
SATELLITE						
QUALIFICATION UNIT(S)			48.1			20.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			.5
CONTRACTOR FEE			2.3			.8
TOTAL SATELLITE			52.6			21.3
AVERAGE UNIT COST (1 SATELLITES)						21.3
TOTAL SATELLITE DDT+E AND RECURRING COST						73.9

VII-308

CC2-1-2 COMSTAR-21

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DESPIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	240006.	0.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	33373.	51633.
403	NUITATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	30617.	34343.
503	GIMBAL ELECTRONCS	3	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTROL ELECTRONCS	2	7.4	3.5	1.00	1192148.	761291.	261167.	476366.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	3	4.1	1.0	1.00	145874.	216423.	305291.	102658.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	56475.	56847.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23850.	29043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	776249.	139061.	319646.	310178.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	2323094.	184082.	423133.	928276.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
206	ANTENNA	1	1.5	0.0	1.00	85846.	43556.	22198.	0.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	24188.	15573.

VII-309

CC2-1-2 COMSTAR-21

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	60.7	0.0	.10	61962.	43871.	162202.	125039.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	158.6	1.00	1327790.	249727.	637873.	0.
WIRING HARNESS	108.9	1.00	438153.	257758.	348679.	0.
THERMAL CONTROL	64.9	1.00	889781.	185612.	177787.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	95.4	1.00	1090899.	648087.	551798.	0.
STRUCTURE	563.6	1.00	2247725.	1219874.	778975.	0.
POWER CONTROL UNITS	52.6	1.00	813883.	260414.	332585.	0.
SATELLITE ADAPTER	88.6	1.00	173466.	67739.	54496.	0.

PROPELLANT WEIGHT 277.5

MISSION EQUIP WEIGHT 254.0

TOTAL SATELLITE WEIGHT 2043.0

VII-310

SATELLITE SYSTEMS COST MODEL.

CC 2-1-3 COMSTAR-2 ✓
also -12 IMAGE XMSN

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL	5
AUXILIARY PROPULSION CONFIGURATION - - MONOPROPELLANT	2
DATA PROCESSING AND INSTRUMENTATION CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)	2
COMMUNICATIONS CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS	2
ELECTRICAL POWER CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY	3
VEHICLE SIZING CONFIGURATION - - CYLINDRICAL	
MISCELLANEOUS INFORMATION	
APOGEE = 19323. NUMBER OF QUAL UNITS = 0	
BOL POWER = 1908. ARRAY AREA = 150.0 SQ FT BATT CAP = 200. AMP-HR	

SPACECRAFT COST MODEL

CC2-1-3 COMSTAR-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.6	10.3	10.7	9.0	19.7
THERMAL CONTROL	2.1	.3	2.4	2.8	1.5	4.3
ELECTRICAL POWER	4.5	1.5	6.0	8.5	12.2	20.7
COMMUNICATIONS	1.4	.5	1.9	2.7	3.6	6.3
DATA HANDLING	9.6	.3	9.8	22.3	2.8	25.1
STABILITY AND CONTROL	4.7	2.4	7.0	12.6	9.7	22.3
AUXILIARY PROPULSION	2.4	1.4	3.8	4.9	6.5	11.4
SPACECRAFT	32.3	8.9	41.2	64.6	45.2	109.8
MISSION EQUIPMENT			52.9			137.4
SATELLITE			94.1			247.2
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT						3.6
CONTRACTOR FEE			3.1			7.9
TOTAL SATELLITE			99.8			258.8
AVERAGE UNIT COST (6 SATELLITES)						43.1
TOTAL SATELLITE DOT+E AND RECURRING COST						358.5

VII-312

CC2-1-3 COMSTAR-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	35443.	43411.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	41437.	34481.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511828.	508286.
2203	CONTROL ELECTRONCS	3	7.1	62.0	1.00	1271747.	1058460.	544597.	649148.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1476726.	139061.	243439.	575273.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4142578.	47819.	83711.	1613782.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	69719.	27902.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	173485.	106333.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMAND SIG COND	4	1.5	.9	1.00	24229.	56157.	57082.	14824.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6995.	5195.

111-313

CG2-1-3 COMSTAR-2

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269 BATTERY	4	71.3	0.0	.10	152945.	81142.	284549.	259170.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.4	1.00	776801.	169552.	329831.	179251.
WIRING HARNESS	140.4	1.00	543492.	319727.	329393.	125414.
THERMAL CONTROL	99.7	1.00	1206763.	248324.	174058.	278467.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	147.7	1.00	1380189.	905430.	587114.	318486.
STRUCTURE	307.5	1.00	3656064.	1415192.	688248.	843657.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	489117.	267397.
SOLAR ARRAY DRIVE	17.3	1.00	690177.	330536.	321498.	159262.
SATELLITE ADAPTER	110.4	1.00	209132.	105042.	47204.	48258.
PROPELLANT WEIGHT	704.0					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE HEIGHT	3227.1					

VII-314

**** SATELLITE SYSTEMS COST MODEL ****
CC2-1-4 WESTAR ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED, LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 353. ARRAY AREA = 109.1 SQ FT BATT CAP = 22. AMP-HR

VII-3/5

SPACECRAFT COST MODEL

CC2-1-4 WESTAR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	1.6	4.5	1.2	1.9	3.1
THERMAL CONTROL	.9	.2	1.0	.3	.3	.6
ELECTRICAL POWER	3.2	1.3	4.5	1.4	2.8	4.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.8	.3	4.0	1.5	.6	2.1
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.6	5.3	21.8	7.5	9.3	16.9
			11.6			17.2
SATELLITE QUALIFICATION UNIT(S)			33.4			34.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			.7
						1.2
TOTAL SATELLITE			36.6			36.0
AVERAGE UNIT COST (2 SATELLITES)						18.0
TOTAL SATELLITE DDT+E AND RECURRING COST						72.7

911-316

CC2-1-4 WESTAR

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	497936.	139061.	159823.	99484.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1715060.	47819.	54958.	342657.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-317

CC2-1-4 WESTAR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
218	BATTERY	2	21.0	0.0	.10	25309.	20430.	74587.	48961.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	53.6	1.00	621537.	91452.	210234.	124179.
WIRING HARNESS	47.8	1.00	217952.	128223.	156108.	43547.
THERMAL CONTROL	30.4	1.00	508018.	110992.	102674.	101498.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	232.6	1.00	1606903.	1116260.	641530.	321048.
POWER CONTROL UNITS	66.6	1.00	431759.	298965.	343638.	86262.
SATELLITE ADAPTER	45.7	1.00	98816.	38390.	33298.	19743.
PROPELLANT WEIGHT	155.0					
MISSION EQUIP WEIGHT	290.0					
TOTAL SATELLITE WEIGHT	1113.9					

VII-318

**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-5 RCA STCM1 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 941. ARRAY AREA = 74.0 SQ FT BATT CAP = 100. AMP-HR

✓11-319

SPACECRAFT COST MODEL

CC2-1-5 RCA STCM1

(MILLIONS OF 1977 DOLLARS)

VII-320

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.0					
THERMAL CONTROL	1.4	1.4	5.5	0.0	1.1	1.1
ELECTRICAL POWER	2.7	.2	1.5	0.0	.2	.2
COMMUNICATIONS	1.3	.9	3.6	.3	1.5	1.8
DATA HANDLING	4.4	.5	1.8	.3	.7	1.0
STABILITY AND CONTROL	4.5	1.3	4.6	0.0	.3	.3
AUXILIARY PROPULSION	1.8	1.9	6.4	1.8	1.6	3.6
		1.0	2.9	.3	1.0	1.3
SPACECRAFT						
MISSION EQUIPMENT	20.1	6.1	26.3	2.7	6.7	9.4
			16.4			7.5
SATELLITE						
QUALIFICATION UNIT(S)			42.6			
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			16.9
CONTRACTOR FEE			2.0			.5
						.7
TOTAL SATELLITE			46.4			18.0
AVERAGE UNIT COST (1 SATELLITES)						18.0
TOTAL SATELLITE DDT+E AND RECURRING COST						64.5

CC2-1-5 RCA STCM1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	2	12.4	15.6	1.00	1304769.	563376.	672052.	521367.
2203	CONTROL ELECTRONCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	588237.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1992403.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	64909.	19836.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	227794.	109070.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	9185.	5329.

VII-321

CC2-1-5 RCA STCH1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.2	0.0	.10	86935.	49236.	182039.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	51.5	1.00	47370.5	88129.	225106.	0.
WIRING HARNESS	56.3	1.00	250413.	147314.	199277.	0.
THERMAL CONTROL	31.4	1.00	807149.	113455.	116263.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	550027.	0.
STRUCTURE	159.0	1.00	1855632.	807857.	515873.	0.
POWER CONTROL UNITS	90.0	1.00	766329.	356549.	455363.	0.
SOLAR ARRAY DRIVE	8.5	1.00	426296.	180670.	230741.	0.
SATELLITE ADAPTER	45.3	1.00	98080.	42565.	36807.	0.
PROPELLANT WEIGHT	218.0					
MISSION EQUIP WEIGHT	225.0					
TOTAL SATELLITE WEIGHT	1237.5					

VII-322

**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-6 RCA STCME2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 960. ARRAY AREA = 75.0 SQ FT BATT CAP = 100. AMP-HR

VII-323

SPACECRAFT COST MODEL

CC2-1-6 RCA STCM2

(MILLIONS OF 1977 DOLLARS)

VII-324

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.1	1.4	5.4	6.4	5.6	12.0
THERMAL CONTROL	1.3	.2	1.4	2.0	.9	2.9
ELECTRICAL POWER	2.7	.8	3.5	5.7	7.9	13.6
COMMUNICATIONS	1.3	.5	1.8	2.7	3.5	6.3
DATA HANDLING	4.4	.3	4.6	6.8	1.8	8.6
STABILITY AND CONTROL	4.3	1.6	5.9	9.0	7.1	16.1
AUXILIARY PROPULSION	1.8	1.0	2.9	4.5	5.7	10.2
SPACECRAFT MISSION EQUIPMENT	19.8	5.7	25.5 17.8	37.2	32.4	69.6 49.4
SATELLITE QUALIFICATION UNIT(S)			43.3			119.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			
CONTRACTOR FEE			1.9			3.0 5.1
TOTAL SATELLITE			47.0			127.1
AVERAGE UNIT COST (7 SATELLITES)						
TOTAL SATELLITE DDT+E AND RECURRING COST						

CC2-1-6 RCA STCM2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	34622.	41333.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	28700.	22755.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	277763.	262988.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	377202.	428395.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	103273.	95481.
894	THRUSTER	6	.7	.1	.10	12597.	35429.	56953.	49546.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	583417.	139061.	132112.	130822.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1977714.	47819.	45429.	443472.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	48289.	18413.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	56375.	78374.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	169468.	101245.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	43690.	10709.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6833.	4947.

VII-325

CC2-1-6 RCA STCM2

ELECTRICAL POWER

IDENT TYPE
269 BATTERY

NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
2	71.4	0.0	.10	86935.	49286.	171412.	143397.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	52.5	1.00	478177.	89712.	170477.	107224.
WTRING HARNESS	50.4	1.00	227975.	134114.	134969.	51120.
THERMAL CONTROL	31.5	1.00	758150.	113700.	86655.	170003.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	409194.	233924.
STRUCTURE	146.2	1.00	1864268.	752233.	357360.	418033.
POWER CONTROL UNITS	82.0	1.00	775344.	337652.	320813.	173859.
SOLAR ARRAY DRIVE	8.7	1.00	433071.	184277.	175087.	97110.
SATELLITE ADAPTER	44.7	1.00	96975.	42374.	27170.	21745.
PROPELLANT WEIGHT	231.5					
MISSION EQUIP WEIGHT	250.0					

TOTAL SATELLITE WEIGHT 1231.2

VII-326

**** SATELLITE SYSTEMS COST MODEL ****
CCA-1-7 MARBAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 401. ARRAY AREA = 124.1 SQ FT BATT CAP = 24. AMP-HR

VII-327

SPACECRAFT COST MODEL

CC2-1-7 MARISAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.5	1.7	4.2	3.5	5.1	8.6
THERMAL CONTROL	.9	.2	1.0	1.2	.8	2.0
ELECTRICAL POWER	3.3	1.3	4.6	5.0	7.4	12.5
COMMUNICATIONS	1.2	.4	1.6	1.9	2.3	4.2
DATA HANDLING	3.2	.3	3.5	4.4	1.5	6.0
STABILITY AND CONTROL	3.1	.9	4.0	4.9	3.7	8.6
AUXILIARY PROPULSION	1.5	.8	2.3	2.7	3.4	6.1
SPACECRAFT MISSION EQUIPMENT	15.8	5.4	21.1 12.5	23.8	24.3	48.1 26.9
SATELLITE QUALIFICATION UNIT(S)			33.7			74.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.5			
CONTRACTOR FEE			1.6			2.2 3.5
TOTAL SATELLITE			36.8			80.6
AVERAGE UNIT COST (6 SATELLITES)						13.4
TOTAL SATELLITE DDT+E AND RECURRING COST						117.4

✓11-328

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CC2-1-7 MARISAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19561.	38267.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	14120.	26802.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12954.	17827.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	221001.	247276.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	164858.	154824.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	416809.	139061.	135244.	96181.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1461546.	47819.	46506.	337260.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	106330.	59314.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

VII-329

CC2-1-7 MARISAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	81929.	46038.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	61.0	1.00	680124.	103086.	200535.	156942.
WIRING HARNESS	43.5	1.00	201217.	118373.	121951.	46432.
THERMAL CONTROL	32.1	1.00	511801.	115163.	89694.	118101.
POWER CONVERTERS	15.9	1.00	590016.	367568.	178758.	136149.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	325446.	203439.
STRUCTURE	248.3	1.00	1437792.	1179987.	573861.	331778.
POWER CONTROL UNITS	66.6	1.00	461474.	298965.	290790.	107411.
SATELLITE ADAPTER	42.4	1.00	61811.	34638.	26968.	14263.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	165.0					
TOTAL SATELLITE WEIGHT	999.9					

VII-330

**** SATELLITE SYSTEMS COST MODEL ****
CCR-1-8 AM SAT CP

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 589. ARRAY AREA = 182.1 SQ FT BATT CAP = 36. AMP-HR

VII-331

SPACECRAFT COST MODEL

CC2-1-8 AM SAT CP

(MILLIONS OF 1977 DOLLARS)

VII-332

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.5	5.6	1.2	3.0	4.2
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.0	1.4	5.4	1.8	3.5	5.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.9	.3	4.2	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	18.0	6.8	24.9	9.3	11.7	21.0
			17.7			15.0
SATELLITE QUALIFICATION UNIT(S)			42.5			36.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			.8
						1.5
TOTAL SATELLITE			46.1			38.4
AVERAGE UNIT COST (2 SATELLITES)						19.2
TOTAL SATELLITE DDT+E AND RECURRING COST						84.5

CC2-1-B AM SAT CP

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	523586.	139061.	159823.	104609.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1794316.	47819.	54958.	358492.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-333

CC2-1-8 AM SAT CP

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	40.3	0.0	.10	37808.	32637.	119151.	73141.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.5	1.00	889705.	147019.	337975.	177757.
WIRING HARNESS	56.8	1.00	252298.	148422.	180700.	50407.
THERMAL CONTROL	42.9	1.00	586940.	140188.	125594.	117267.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	398.5	1.00	1683618.	1764051.	1013825.	336375.
POWER CONTROL UNITS	77.6	1.00	582617.	326931.	375784.	116403.
SATELLITE ADAPTER	62.2	1.00	128416.	45960.	39878.	25657.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 250.0

TOTAL SATELLITE WEIGHT 1355.8

VII-334

**** SATELLITE SYSTEMS COST MODEL ****
CCR-1-9 385-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (OTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 488. ARRAY AREA = 150.8 SQ FT BATT CAP = 30. AMP-HR

VII-335

SPACECRAFT COST MODEL

CC2-1-9 SBS-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.8	2.1	4.9	2.0	3.5	5.5
THERMAL CONTROL	0.9	0.2	1.1	0.7	0.5	1.1
ELECTRICAL POWER	3.7	1.3	5.0	2.8	4.5	7.4
COMMUNICATIONS	1.2	0.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.5	0.3	3.8	2.5	0.9	3.4
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.5	0.8	2.3	1.4	1.9	3.3
SPACECRAFT	17.0	6.3	23.3	14.6	15.3	30.0
MISSION EQUIPMENT			14.8			17.2
SATELLITE			38.1			47.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.6			1.2
LAUNCH SITE SUPPORT			1.7			2.2
CONTRACTOR FEE						
TOTAL SATELLITE			41.4			50.5
AVERAGE UNIT COST (3 SATELLITES)						16.8
TOTAL SATELLITE DDT+E AND RECURRING COST						91.9

73-11K
336

CC2-1-9 SBS-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	467158.	139061.	150270.	109586.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1619411.	47819.	51673.	379882.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

VII-337

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CC2-1-9 SBS-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	30.4	0.0	.10	32587.	26634.	96132.	60703.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	74.1	1.00	779517.	123435.	266798.	182860.
WIRING HARNESS	51.2	1.00	231040.	135917.	155584.	54197.
THERMAL CONTROL	36.9	1.00	554382.	126575.	108125.	130047.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	206812.
STRUCTURE	315.4	1.00	1554472.	1446037.	781385.	364649.
POWER CONTROL UNITS	75.0	1.00	521654.	320478.	346349.	122370.
SATELLITE ADAPTER	51.3	1.00	109018.	39838.	33498.	25573.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					

TOTAL SATELLITE WEIGHT 1162.4

VII-338

**** SATELLITE SYSTEMS COST MODEL ****
CC 2-1-10

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1908. ARRAY AREA = 150.0 SQ FT BATT CAP = 200. ANP = HR

VII-339

SPACECRAFT COST MODEL

CC2-1-10 SBS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.6	10.3	14.7	12.7	27.4
THERMAL CONTROL	2.1	.3	2.4	3.9	2.1	6.0
ELECTRICAL POWER	4.5	1.5	6.0	11.7	17.4	29.0
COMMUNICATIONS	1.4	.5	1.9	3.6	5.0	8.7
DATA HANDLING	9.6	.3	9.8	29.3	3.9	33.2
STABILITY AND CONTROL	4.7	2.4	7.0	16.4	13.6	30.0
AUXILIARY PROPULSION	2.4	1.4	3.8	6.8	9.3	16.0
SPACECRAFT MISSION EQUIPMENT	32.3	8.9	41.2 52.9	86.3	64.0	150.3 193.8
SATELLITE QUALIFICATION UNIT(S)			94.1			344.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			
CONTRACTOR FEE			3.1			5.4 10.9
TOTAL SATELLITE			99.8			360.4
AVERAGE UNIT COST (- 9-SATELLITES)						40.0
TOTAL SATELLITE DDT+E AND RECURRING COST						460.2

CC2-1-10 SBS-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	33325.	37920.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	38960.	29614.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	481236.	444003.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1271747.	1058460.	512047.	557522.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	101729.	90926.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	71602.	59228.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1476726.	139061.	228889.	502518.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4142578.	47819.	78708.	1409687.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	34662.	38681.	65552.	23963.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	54262.	73893.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	163116.	92885.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	51522.	29247.
503	COMMAND SIG COND	4	1.5	.9	1.00	24229.	56157.	53671.	12615.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6577.	2448.

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ELECTRICAL POWER

IDENT TYPE
269 BATTERY

NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
4	71.3	0.0	.10	152945.	81142.	277984.	240243.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.4	1.00	776801.	169552.	310117.	164227.
WIRING HARNESS	140.4	1.00	543492.	319727.	309705.	114902.
THERMAL CONTROL	99.7	1.00	1206763.	248324.	163655.	255128.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	147.7	1.00	1380189.	905430.	552023.	291793.
STRUCTURE	307.5	1.00	3656064.	1415192.	647111.	772947.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	459883.	244985.
SOLAR ARRAY DRIVE	17.3	1.00	690177.	330536.	302282.	145914.
SATELLITE ADAPTER	110.4	1.00	209132.	105042.	44382.	44214.
PROPELLANT WEIGHT	704.0					
MISSION EQUIP WEIGHT	1000.0					

TOTAL SATELLITE WEIGHT 3227.1

VII-342

**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-11 PBLC SVCA

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION
CONFIGURATION - - MONO*ROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BDL POWER = 1192. ARRAY AREA = 368.5 SQ FT BATT CAP = 72. AMP-HR

VII-343

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SPACECRAFT COST MODEL

CC2-1-11 PBLC SVCE

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	2.0	6.7	1.9	2.3	4.2
THERMAL CONTROL	1.4	.4	1.8	.6	.6	1.2
ELECTRICAL POWER	5.9	1.7	7.5	2.7	4.6	7.4
COMMUNICATIONS	.8	.3	1.1	.6	.9	1.6
DATA HANDLING	6.6	.4	7.1	5.5	1.5	7.0
STABILITY AND CONTROL	5.1	1.7	6.9	3.5	2.1	5.6
AUXILIARY PROPULSION	1.6	.8	2.4	.9	1.4	2.3
SPACECRAFT	26.1	7.3	33.4	15.7	13.5	29.2
MISSION EQUIPMENT			37.5			33.5
SATELLITE			70.9			62.7
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.2			
LAUNCH SITE SUPPORT			2.5			1.0
CONTRACTOR FEE						2.1
TOTAL SATELLITE			75.6			65.8
AVERAGE UNIT COST (2 SATELLITES)						32.9
TOTAL SATELLITE DDT+E AND RECURRING COST						141.4

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CC2-1-11 PBLC SVCE

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DESPIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	216006.	262691.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	30036.	61949.
403	NUTATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	27556.	41205.
503	GIMBAL ELECTRONICS	2	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	235050.	571540.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	132477.	153300.	194819.	63512.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55765.	54496.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23550.	27842.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	917335.	139061.	159823.	183277.
406	COMM DECOD+DISTR	2	11.0	5.5	1.00	2971262.	184082.	380820.	1424483.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
206	ANTENNA	1	1.5	0.0	1.00	86846.	43556.	19978.	17351.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	139708.	82800.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	21769.	18684.

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CC2-1-11 P8LC SVCE

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	63.2	0.0	.10	66515.	45190.	164980.	128677.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	181.1	1.00	1457227.	282370.	649127.	291144.
WIRING HARNESS	117.6	1.00	467661.	275117.	334946.	93435.
THERMAL CONTROL	113.0	1.00	815116.	270329.	221325.	162854.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	75.1	1.00	939807.	539689.	413555.	187767.
STRUCTURE	652.7	1.00	2567161.	1341602.	771037.	512901.
POWER CONTROL UNITS	43.7	1.00	880009.	233652.	268566.	175820.
SATELLITE ADAPTER	105.5	1.00	201215.	79598.	54321.	40201.
PROPELLANT WEIGHT	194.4					
MISSION EQUIP WEIGHT	600.0					

TOTAL SATELLITE WEIGHT 2425.8

VII-346

**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-12 IMAGE XMSN

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDED MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1908. ARRAY AREA = 150.0 SQ FT BATT CAP = 200. AMP-HR

VII-347

SPACECRAFT COST MODEL

CC2-1-12 IMGE XMSN

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.6	10.3	10.7	9.0	19.7
THERMAL CONTROL	2.1	.3	2.4	2.8	1.5	4.3
ELECTRICAL POWER	4.5	1.5	6.0	8.5	12.2	20.7
COMMUNICATIONS	1.4	.5	1.9	2.7	3.6	6.3
DATA HANDLING	9.6	.3	9.8	22.3	2.8	25.1
STABILITY AND CONTROL	4.7	2.4	7.0	12.6	9.7	22.3
AUXILIARY PROPULSION	2.4	1.4	3.8	4.9	6.5	11.4
SPACECRAFT	32.3	8.9	41.2	64.6	45.2	109.8
MISSION EQUIPMENT			57.8			136.1
SATELLITE			98.9			246.0
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT			3.1			3.6
CONTRACTOR FEE						7.9
TOTAL SATELLITE			104.6			257.5
AVERAGE UNIT COST (6 SATELLITES)						42.9
TOTAL SATELLITE DDT+E AND RECURRING COST						362.1

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CC2-1-12 IMGE XMSN

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	35443.	43411.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	41437.	34481.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511828.	508286.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1271747.	1058460.	544597.	649148.

AUXILIARY PROPUSSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMTRY	2	8.9	3.0	1.00	1476726.	139061.	243439.	575273.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4142578.	47819.	83711.	1613782.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	69719.	27902.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	173485.	106333.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMANC SIG COND	4	1.5	.9	1.00	24229.	56157.	57082.	14824.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6995.	5195.

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CC2-1-12 IMGE XMSN

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	4	71.3	0.0	.10	152945.	81142.	284549.	259170.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.4	1.00	776801.	169552.	329831.	179251.
WIRING HARNESS	140.4	1.00	543492.	319727.	329393.	125414.
THERMAL CONTROL	99.7	1.00	1206763.	248324.	174058.	278467.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	147.7	1.00	1380189.	905430.	587114.	318486.
STRUCTURE	307.5	1.00	3656064.	1415192.	688248.	843657.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	489117.	267397.
SOLAR ARRAY DRIVE	17.3	1.00	690177.	330536.	321498.	159262.
SATELLITE ADAPTER	110.4	1.00	209132.	105042.	47204.	48258.
PROPELLANT WEIGHT	704.0					
MISSION EQUIP WEIGHT	1000.0					

TOTAL SATELLITE WEIGHT 3227.1

VII-350

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**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-13 HCF BCST

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 644. ARRAY AREA = 199.0 SQ FT BATT CAP. = 40. AMP-HR

V11-351

SPACECRAFT COST MODEL

CC2-1-13 NCWF BCST

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DOT+E-----	-----DOT+E-----	-----DOT+E-----	-----DOT+E-----	-----DOT+E-----	-----DOT+E-----
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	RECURRING FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.2	2.6	5.8	0.0	1.8	1.8
THERMAL CONTROL	1.0	.2	1.2	0.0	.2	.2
ELECTRICAL POWER	4.2	1.4	5.6	.1	2.0	2.1
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.7
DATA HANDLING	4.1	.3	4.4	0.0	.3	.3
STABILITY AND CONTROL	3.3	1.3	4.6	1.1	1.1	2.2
AUXILIARY PROPULSION	1.6	.8	2.4	.1	.7	.9
SPACECRAFT MISSION EQUIPMENT	18.6	7.1	25.7 19.1	1.5	6.7	8.2 9.2
SATELLITE QUALIFICATION UNIT(S)			44.7			17.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			.4 .6
TOTAL SATELLITE			48.4			18.4
AVERAGE UNIT COST (1 SATELLITES)						18.4
TOTAL SATELLITE DOT+E AND RECURRING COST						66.8

CC2-1-13 HQVF BCST

* * * * * ASSEMBLY DESCRIPTIONS * * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	522333.	476366.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	548347.	139061.	177581.	0.
403	COU	1	12.3	7.5	1.00	1870458.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-5-5

CG2-1-13 HCVF BCST

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34199.	126443.	83138.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	98.0	1.00	946766.	159904.	408441.	0.
WIRING HARNESS	60.3	1.00	265421.	156143.	211220.	0.
THERMAL CONTROL	45.9	1.00	603804.	146762.	145177.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	446813.	0.
STRUCTURE	426.7	1.00	1747699.	1869611.	1193877.	0.
POWER CONTROL UNITS	77.6	1.00	613852.	326931.	417537.	0.
SATELLITE ADAPTER	66.3	1.00	135576.	48590.	45994.	0.

PROPELLANT WEIGHT 145.0

MISSION EQUIP WEIGHT 270.0

TOTAL SATELLITE WEIGHT 1438.0

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**** SATELLITE SYSTEMS COST MODEL ****

CC2-1-1A OTHER VS, CC3-1-3, -4

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 409. APRAY AREA = 127.0 SQ FT BATT CAP = 24. AHP-HR

V11-355

SPACECRAFT COST MODEL

CC2-1-14 OTHER US, CC3-1-3, -4

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.7	4.4	4.3	6.0	10.3
THERMAL CONTROL	.9	.2	1.0	1.4	.9	2.3
ELECTRICAL POWER	3.4	1.3	4.7	5.8	8.7	14.5
COMMUNICATIONS	1.2	.4	1.6	2.2	2.6	4.8
DATA HANDLING	3.4	.3	3.7	5.3	1.8	7.1
STABILITY AND CONTROL	3.1	.9	4.0	5.6	4.2	9.8
AUXILIARY PROPULSION	1.5	.8	2.3	3.1	3.9	7.0
SPACECRAFT MISSION EQUIPMENT	16.2	5.5	21.7 14.8	27.6	28.1	55.7 35.2
SATELLITE QUALIFICATION UNIT(S)			36.4			90.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			2.6
CONTRACTOR FEE			1.6			4.1
TOTAL SATELLITE			39.6			97.6
AVERAGE UNIT COST (7 SATELLITES)						13.9
TOTAL SATELLITE DDT+E AND RECURRING COST						137.2

✓ 11-356

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CC2-1-14 OTHER US, CC3-1-3, -4

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19108.	37186.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	13793.	26045.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12654.	17323.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	215683.	240288.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	161040.	147415.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72688.	62195.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELMETRY	1	8.9	3.0	1.00	446296.	139061.	132112.	100075.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1554216.	47819.	45429.	348509.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26827.	10006.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	56375.	78374.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	103867.	56476.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	30978.	7475.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16324.	12873.

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CC2-1-14 OTHER US, CC3-1-3, -4

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	81254.	44814.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	62.2	1.00	691366.	104963.	199457.	15502
WIRING HARNESS	46.3	1.00	212148.	124803.	125598.	4757
THERMAL CONTROL	32.9	1.00	521022.	117102.	88888.	11683
POWER CONVERTERS	15.9	1.00	590016.	367568.	174619.	13230
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	317909.	19769
STRUCTURE	259.0	1.00	1497414.	1223071.	581039.	33577
POWER CONTROL UNITS	70.8	1.00	470678.	309854.	294402.	10554
SATELLITE ADAPTER	45.0	1.00	97528.	36489.	27277.	2186

PROPELLANT WEIGHT 140.0

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1057.0

✓ 11-358

** SATELLITE SYSTEMS COST MODEL **
CC3-1-1 ARCADE SAT-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 416. ARRAY AREA = 129.0 SQ FT BATT CAP = 28. AMP-HR

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SPACECRAFT COST MODEL

CC3-1-1 ARCOMSAT1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	1.1	2.1	3.2
THERMAL CONTROL	.9	.2	1.1	.4	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.6
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.7	1.4	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.3	5.5	21.8 14.8	7.5	9.7	17.2 13.5
SATELLITE QUALIFICATION UNIT(S)			36.6			30.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			.7 1.3
TOTAL SATELLITE			39.8			32.7
AVERAGE UNIT COST (2 SATELLITES)						16.4
TOTAL SATELLITE DDT+E AND RECURRING COST						72.5

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CC3-1-1 ARCOMSAT1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	451904.	139061.	159823.	90287.
403	COMM DECODE+DISTR	1	2.3	7.5	1.00	1571770.	47819.	54958.	314026.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG CEND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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CC3-1-1 ARCOMSAT1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	94334.	59595.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	698970.	106524.	244884.	139649.
WIRING HARNESS	46.5	1.00	212925.	125260.	152500.	42541.
THERMAL CONTROL	33.3	1.00	531991.	118065.	108295.	106288.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	264.8	1.00	1510062.	1246314.	716274.	301700.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	356155.	94976.
SATELLITE ADAPTER	45.7	1.00	98816.	37004.	33298.	19743.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1072.9

V11-362

**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-2 ARCOMSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (OTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 488. ARRAY AREA = 150.8 SQ FT BATT CAP = 30. AMP-HR

V11-363

SPACECRAFT COST MODEL

CC3-1-2 ARCOMSAT-2

MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	2.1	5.0	2.8	4.5	7.3
THERMAL CONTROL	.9	.2	1.1	.9	.6	1.5
ELECTRICAL POWER	3.7	1.4	5.0	3.9	5.8	9.7
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.7	.3	4.0	3.6	1.1	4.7
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT	17.3	6.3	23.7	19.7	19.7	39.5
MISSION EQUIPMENT			17.3			25.9
SATELLITE			41.0			65.4
QUALIFICATION UNIT(S)			0.0			
GSF (AGE)			1.6			
LAUNCH SITE SUPPORT			1.8			1.6
CONTRACTOR FEE						2.9
TOTAL SATELLITE			44.4			69.9
AVERAGE UNIT COST (4 SATELLITES)						17.5
TOTAL SATELLITE DDT+E AND RECURRING COST						114.3

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CC3-1-2 ARCOMSAT-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	NUTATION CAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	495721.	139061.	143841.	118829.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	1708195.	47819.	49463.	409472.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

V11-365

75

CC3-1-2 ARCOMSAT-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	30.4	0.0	.10	32587.	26634.	95138.	58658.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	74.1	1.00	779698.	123435.	255383.	186902.
WIRING HARNESS	53.1	1.00	238290.	140182.	153601.	57121.
THERMAL CONTROL	37.3	1.00	556596.	127504.	104153.	133422.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	321.6	1.00	1610031.	1470164.	760433.	385941.
POWER CONTROL UNITS	75.0	1.00	521905.	320478.	331531.	125106.
SATELLITE ADAPTER	53.3	1.00	112620.	41470.	32790.	26996.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 240.0

TOTAL SATELLITE WEIGHT 1212.9

V11-366

**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-4 EGS-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - NONPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0

BOL POWER = 409. ARRAY AREA = 127.0 SQ FT BATT CAP = 24. ANP-HR

V11-367

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SPACECRAFT COST MODEL

CC3-1-~~4~~ ECS-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.7	4.4	1.1	2.1	3.2
THERMAL CONTROL	.9	.2	1.0	.4	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.5
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.7	1.4	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROVISION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.2	5.5	21.7 14.8	7.4	9.6	17.1 12.2
SATELLITE QUALIFICATION UNIT(S)			36.4			29.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			.7
CONTRACTOR FEE			1.6			1.2
TOTAL SATELLITE			39.6			31.2
AVERAGE UNIT COST (— 2 SATELLITES)						15.6
TOTAL SATELLITE DDT+E AND RECURRING COST						70.9

VII-368

CC3-1-// ECS-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	446296.	139061.	159823.	89167.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1554216.	47819.	54958.	310521.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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CC3-1-4 ECS-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	85293.	52559.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	62.2	1.00	691366.	104963.	241294.	13813.
WIRING HARNESS	46.3	1.00	212148.	124803.	151944.	4238.
THERMAL CONTROL	32.9	1.00	521022.	117102.	107532.	10409.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	11788.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	17614.
STRUCTURE	259.0	1.00	1497414.	1223071.	702916.	29917.
POWER CONTROL UNITS	70.8	1.00	470678.	309854.	356155.	9403.
SATELLITE ADAPTER	45.0	1.00	97528.	36489.	32998.	1948.

PROPELLANT WEIGHT 140.0

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1057.0

VII-370

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**** SATELLITE SYSTEMS COST MODEL ****
CC3-45 ELS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 423. ARRAY AREA = 130.7 SQ FT BATT CAP = 28. AMP-HR

111-371

P/

SPACECRAFT COST MODEL

CC3-1-5 ECS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	2.6	3.9	6.5
THERMAL CONTROL	.9	.2	1.1	.9	.6	1.4
ELECTRICAL POWER	3.4	1.3	4.7	3.6	5.5	9.1
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.4	.3	3.7	3.3	1.1	4.4
STABILITY AND CONTROL	3.1	.9	4.0	3.5	2.6	6.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT	16.3	5.5	21.9	17.2	17.7	34.8
MISSION EQUIPMENT			14.8			21.9
SATELLITE			36.6			56.8
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.6			1.5
LAUNCH SITE SUPPORT			1.6			2.5
CONTRACTOR FEE						
TOTAL SATELLITE			39.9			60.8
AVERAGE UNIT COST (4 SATELLITES)						15.2
TOTAL SATELLITE DDT+E AND RECURRING COST						100.7

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CC3-1-5 ECS-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	235050.	256872.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	452245.	139061.	143841.	108408.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1572838.	47819.	49463.	377025.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
703	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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CC3-1-5 ECS-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	92300.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	64.3	1.00	705405.	108240.	223946.	16909.
WIPING HARNESS	46.7	1.00	213701.	125717.	137751.	5122.
THERMAL CONTROL	33.6	1.00	531835.	118785.	97979.	12748.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	14143.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	21133.
STRUCTURE	269.2	1.00	1512210.	1263895.	653741.	36249.
POWER CONTROL UNITS	70.8	1.00	480037.	309854.	320540.	11507.
SATELLITE ADAPTER	46.1	1.00	99550.	37207.	30121.	2386.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1079.3

VII-374

**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-6 MAR 67-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 396. ARRAY AREA = 122.0 SQ FT BATT CAP = 24. AMP-HR

VII-375

R-5.

SPACECRAFT COST MODEL

CC3-1-6 MAROTS-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.7	4.3	0.0	1.1	1.1
THERMAL CONTROL	.9	.2	1.0	0.0	.2	.2
ELECTRICAL POWER	3.3	1.3	4.6	.1	1.6	1.7
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.6
DATA HANDLING	3.4	.3	3.6	0.0	.3	.3
STABILITY AND CONTROL	3.1	.9	4.0	.3	.8	1.1
AUXILIARY PROPULSION	1.5	.8	2.3	.1	.7	.8
SPACECRAFT MISSION EQUIPMENT	16.0	5.4	21.4 14.8	.6	5.3	5.9 6.8
SATELLITE QUALIFICATION UNIT(S)			36.2			12.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			.4 .4
TOTAL SATELLITE			39.3			13.4
AVERAGE UNIT COST (1 SATELLITES)						13.4
TOTAL SATELLITE DDT+E AND RECURRING COST						52.8

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PC

CC3-1-6 MAROTS-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
934	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMTRY	1	8.9	3.0	1.00	442047.	139061.	177581.	0.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1540902.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG CCND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CC3-1-6 MAROTS-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	86379.	54827.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	60.2	1.00	672198.	101834.	260112.	0.
WIRING HARNESS	45.0	1.00	207086.	121325.	164797.	0.
THERMAL CONTROL	32.2	1.00	513887.	115407.	117986.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	427324.	0.
STRUCTURE	249.5	1.00	1486609.	1184833.	756598.	0.
POWER CONTROL UNITS	66.6	1.00	461867.	298965.	381820.	0.
SATELLITE ADAPTER	43.9	1.00	63665.	35895.	36138.	0.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1038.4

11-378

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**** SATELLITE SYSTEMS COST MODEL ****

CC3-1-7 MARKETS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 416. ARRAY AREA = 129.0 SQ FT BATT CAP = 28. AMP-HR

VII-379

SPACECRAFT COST MODEL

CC3-1-7 MARCTS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	3.8	5.4	9.2
THERMAL CONTROL	.9	.2	1.1	1.3	.8	2.0
ELECTRICAL POWER	3.4	1.3	4.7	5.2	7.7	12.9
COMMUNICATIONS	1.2	.4	1.6	1.9	2.3	4.2
DATA HANDLING	3.4	.3	3.7	4.8	1.5	6.3
STABILITY AND CONTROL	3.1	.9	4.0	4.9	3.7	8.6
AUXILIARY PROPULSION	1.5	.8	2.3	2.7	3.4	6.1
SPACECRAFT	16.3	5.5	21.8	24.6	24.8	49.4
MISSION EQUIPMENT			14.8			30.9
SATELLITE			36.6			80.4
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT			1.6			2.2
CONTRACTOR FEE						3.6
TOTAL SATELLITE			39.8			86.2
AVERAGE UNIT COST (6 SATELLITES).						14.4
TOTAL SATELLITE DDT+E AND RECURRING COST						126.0

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11-380

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CC3-1-7 MAROTS-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19561.	38267.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	14120.	26802.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12954.	17827.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	221001.	247276.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	164858.	154824.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	451904.	139061.	135244.	104279.
403	CDU	1	12.3	7.5	1.00	1571770.	47819.	46506.	362695.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	106330.	59314.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIFLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

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91.

CC3-1-7 MARCTS-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	90614.	52201.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	698970.	106524.	207223.	161291.
WIRING HARNESS	46.5	1.00	212925.	125260.	129047.	49134.
THERMAL CONTROL	33.3	1.00	531991.	118065.	91640.	122760.
POWER CONVERTERS	15.9	1.00	590016.	367568.	178758.	136149.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	325446.	203439.
STRUCTURE	264.8	1.00	1510062.	1246314.	606117.	348455.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	301381.	109695.
SATELLITE ADAPTER	45.7	1.00	98816.	37004.	28177.	22802.
PROPELLANT HEIGHT	140.2					
MISSION EQUIP HEIGHT	200.0					

TOTAL SATELLITE WEIGHT 1072.9

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**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-8 TVBS-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1565. ARRAY AREA = 123.0 SQ FT BATT CAP = 144. AMP-HR

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SPACECRAFT COST MODEL

CC3-1-B TVBS-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.8	2.3	9.1	0.0	1.8	1.8
THERMAL CONTROL	1.7	.3	2.1	0.0	.3	.3
ELECTRICAL POWER	3.9	1.2	5.1	.4	2.1	2.5
COMMUNICATIONS	1.4	.5	1.9	.3	.8	1.1
DATA HANDLING	8.3	.3	8.5	3.3	.6	3.9
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	2.4	1.4	3.8	.3	1.4	1.7
SPACECRAFT MISSION EQUIPMENT	29.0	7.9	36.9 49.2	6.2	8.8	15.0 25.3
SATELLITE QUALIFICATION UNIT(S)			86.1			40.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.4			
CONTRACTOR FEE			2.8			.6 1.1
TOTAL SATELLITE			91.3			41.9
AVERAGE UNIT COST (1 SATELLITES)						41.9
TOTAL SATELLITE DDT+E AND RECURRING COST						133.2

Model 11-384

CC3-1-8 TVBS-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1261621.	139061.	319646.	504126.
403	COMMD DECCD+DISTR	2	2.3	7.5	1.00	3595649.	47819.	109917.	1436770.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	91544.	38468.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	227794.	109070.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG CCND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	9185.	5329.

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CC3-1-8 TVBS-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	4	49.5	0.0	.10	117020.	62393.	230684.	236148.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	85.6	1.00	676051.	141077.	360350.	0.
WIRING HARNESS	117.1	1.00	465975.	274125.	370820.	0.
THERMAL CONTRLL	90.6	1.00	1019844.	232722.	216101.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	148.2	1.00	1383179.	907774.	772902.	0.
STRUCTURE	275.3	1.00	3231876.	1288197.	822604.	0.
POWER CONTROL UNITS	122.6	1.00	1031945.	427223.	545623.	0.
SOLAR ARRAY DRIVE	14.2	1.00	603694.	279463.	356913.	0.
SATELLITE ADAPTER	94.6	1.00	183402.	89140.	56626.	0.

PROPELLANT WEIGHT 595.7

MISSION EQUIP WEIGHT 830.0

TOTAL SATELLITE WEIGHT 2711.9

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**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-9 TYBS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1564. ARRAY AREA = 123.0 SQ FT BATT CAP = 144. AMP-HR

111-28-7

SPACECRAFT COST MODEL

CC3-1-9 TVBS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.8	2.3	9.1	6.5	5.6	12.2
THERMAL CONTROL	1.7	.3	2.0	1.6	1.0	2.6
ELECTRICAL POWER	3.9	1.2	5.1	4.9	7.1	12.1
COMMUNICATIONS	1.4	.5	1.9	2.0	2.5	4.4
DATA HANDLING	8.0	.3	8.3	7.7	1.1	8.8
STABILITY AND CONTROL	4.5	1.9	6.4	7.9	5.9	13.8
AUXILIARY PROPULSION	2.4	1.4	3.8	3.3	4.5	7.8
SPACECRAFT MISSION EQUIPMENT	28.6	7.9	36.5 49.8	33.9	27.7	61.6 83.2
SATELLITE QUALIFICATION UNIT(S)			86.3			144.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.4			
CONTRACTOR FEE			2.7			2.1 4.5
TOTAL SATELLITE			91.4			151.4
AVERAGE UNIT COST (4 SATELLITES)						37.9
TOTAL SATELLITE DDT+E AND RECURRING COST						242.8

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CC3-1-9 TVBS-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	44071.	39474.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	544365.	568085.
2203	CONTROL ELECTPNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	1126824.	139061.	143841.	270111.
403	COMMD DECCD+CISTR	1	2.3	7.5	1.00	3575061.	47819.	49463.	856978.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38691.	74151.	31941.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	184514.	118843.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	582816.	37421.
503	COMMAND SIG CCND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	7440.	5807.

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CC3-1-9 TVBS-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	4	49.5	0.0	.10	117020.	62393.	222872.	210638.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	85.5	1.00	676051.	140924.	291569.	162056.
WIRING HARNESS	112.5	1.00	450405.	264966.	290329.	107967.
THERMAL CONTROL	91.0	1.00	991399.	233418.	175494.	237648.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	146.8	1.00	1383179.	901206.	621524.	331562.
STRUCTURE	272.0	1.00	3220077.	1275060.	659517.	771885.
POWER CONTROL UNITS	126.9	1.00	1031559.	435926.	450960.	247275.
SOLAR ARRAY DRIVE	14.2	1.00	603694.	279463.	289101.	144712.
SATELLITE ADAPTER	94.0	1.00	182413.	88630.	45697.	43726.
PROPELLANT WEIGHT	595.7					
MISSION EQUIP WEIGHT	840.0					

TOTAL SATELLITE WEIGHT 2695.4

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**** SATELLITE SYSTEMS COST MODEL ****
CCS-110 SYMPHONY-3

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 483. ARRAY AREA = 38.0 SQ FT BATT CAP = 44. AMP-HR

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SPACECRAFT COST MODEL

CC3-1-10 SYMPHNY-3

(MILLIONS OF 1977 DOLLARS)

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SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	.9	4.0	0.0	.7	.7
THERMAL CONTROL	1.0	.1	1.1	0.0	.1	.1
ELECTRICAL POWER	1.8	.6	2.4	.2	1.0	1.1
COMMUNICATIONS	1.3	.4	1.7	.1	.5	.6
DATA HANDLING	3.6	.3	3.9	0.0	.3	.3
STABILITY AND CONTROL	5.3	2.1	7.4	2.1	2.1	4.2
AUXILIARY PROPULSION	1.4	.8	2.2	.2	.8	1.0
SPACECRAFT						
MISSION EQUIPMENT	17.4	5.2	22.7	2.5	5.6	8.1
			16.5			7.7
SATELLITE						
QUALIFICATION UNIT(S)			39.1			15.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.7			.4
						.6
TOTAL SATELLITE			42.5			16.8
						16.8
AVERAGE UNIT COST (1 SATELLITES)						16.8
TOTAL SATELLITE DDT+E AND RECURRING COST						59.3

CC3-1-10 SYMPHNY-3

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1401	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1809	EARTH SENSOR	2	22.2	1.4	1.00	1807116.	696982.	916379.	722098.
2203	CONTROL ELECTRONCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	101655.	101482.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	475022.	139061.	177581.	0.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1643908.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	64909.	19836.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
327	TRANSMITTER	1	4.7	18.0	1.00	245354.	53280.	126552.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG CCND.	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	9185.	5329.

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CC3-1-10 SYMPHNY-3

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
243	BATTERY	2	37.1	0.0	.10	44526.	30747.	113681.	89853.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	26.4	1.00	297094.	47467.	121244.	0.
WIRING HARNESS	37.7	1.00	178223.	104845.	141829.	0.
THERMAL CONTRCL	21.5	1.00	585642.	87760.	93156.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	65.1	1.00	814623.	483803.	411922.	0.
STRUCTURE	101.3	1.00	1476310.	550700.	351660.	0.
POWER CONTROL UNITS	47.6	1.00	518770.	245634.	313708.	0.
SOLAR ARRAY DRIVE	4.4	1.00	272789.	103232.	131842.	0.
SATELLITE ADAPTER	32.0	1.00	48661.	30583.	30035.	0.
PROPELLANT WEIGHT	118.0					
MISSION EQUIP WEIGHT	229.0					
TOTAL SATELLITE WEIGHT	870.7					

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**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-11 AMSAT

JRSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 77.1 ARRAY AREA = 23.7 SQ FT BATT CAP = 66 AMP-HR

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SPACECRAFT COST MODEL

CC3-1-11 AMSAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.4	.4	1.9	0.0	.3	.3
THERMAL CONTROL	.7	.1	.7	0.0	.1	.1
ELECTRICAL POWER	1.9	1.0	2.8	.0	1.0	1.0
COMMUNICATIONS	1.2	.3	1.5	0.0	.4	.4
DATA HANDLING	1.9	.3	2.1	0.0	.3	.3
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	10.9	3.5	14.4 3.7	.2	3.3	3.5 1.4
SATELLITE QUALIFICATION UNIT(S)			18.1			4.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE			1.1			.3 .3
TOTAL SATELLITE			20.4			9.4
AVERAGE UNIT COST (1 SATELLITES)						9.4
TOTAL SATELLITE DDT+E AND RECURRING COST						29.8

CC3-1-11 AMSAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	234664.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	871803.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CC3-1-11 AMSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DOT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	11.7	1.00	213486.	22342.	57068.	0.
WIRING HARNESS	20.3	1.00	105434.	62025.	83904.	0.
THERMAL CONTROL	14.3	1.00	386332.	66561.	73385.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.8	1.00	755900.	418145.	356020.	0.
STRUCTURE	50.9	1.00	829155.	306801.	195914.	0.
POWER CONTROL UNITS	43.5	1.00	176795.	233026.	297606.	0.
SATELLITE ADAPTER	13.4	1.00	11610.	14020.	18050.	0.

PROPELLANT WEIGHT 45.8

MISSION EQUIP WEIGHT 35.0

TOTAL SATELLITE WEIGHT 379.2

VII-398

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SATELLITE SYSTEMS COST MODEL **
23-1-12 APPLE

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 360. ARRAY AREA = 111.0 SQ FT BATT CAP = 22. AMP-HR

SPACECRAFT COST MODEL

CC3-1-12 APPLE

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.4	1.5	3.9	0.0	1.0	1.0
THERMAL CONTROL	.8	.2	1.0	0.0	.2	.2
ELECTRICAL POWER	3.2	1.2	4.4	.1	1.5	1.6
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.6
DATA HANDLING	3.0	.3	3.3	0.0	.3	.3
STABILITY AND CONTROL	3.1	.9	4.0	.3	.8	1.1
AUXILIARY PROPULSION	1.5	.8	2.3	.1	.7	.8
SPACECRAFT	15.3	5.2	20.4	.6	5.1	5.7
MISSION EQUIPMENT			11.2			5.0
SATELLITE			31.7			10.7
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.5			
LAUNCH SITE SUPPORT			1.5			.4
CONTRACTOR FEE						.4
TOTAL SATELLITE			34.7			11.5
AVERAGE UNIT COST (1 SATELLITES)						11.5
TOTAL SATELLITE DOT+E AND RECURRING COST						46.2

007-111

CC3-1-12 APPLE

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
934	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	389113.	139061.	177581.	0.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1373897.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-401

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CC3-1-12 APPLE

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
218	BATTERY	2	21.0	0.0	.10	25309.	20430.	75537.	51073.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	54.6	1.00	629175.	93031.	237626.	0.
WIRING HARNESS	40.3	1.00	188593.	110946.	150081.	0.
THERMAL CONTROL	29.7	1.00	489505.	109253.	112538.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	427324.	0.
STRUCTURE	216.3	1.00	1373743.	1049410.	670121.	0.
POWER CONTROL UNITS	66.6	1.00	436820.	298965.	381820.	0.
SATELLITE ADAPTER	38.2	1.00	56567.	31976.	33314.	0.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 145.0

TOTAL SATELLITE WEIGHT 917.6

VII-402.

**** SATELLITE SYSTEMS COST MODEL ****
003-1-13 INSAT-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 416. ARRAY AREA = 129.0 SQ FT BATT CAP = 20. AMP-HR

VII-403

SPACECRAFT COST MODEL

CC3-1-13 INSAT-1

(MILLIONS OF 1977 DOLLARS)

✓11-404

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	1.1	2.1	3.2
THERMAL CONTROL	.9	.2	1.1	.4	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.5
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.7	1.4	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.3	5.5	21.8 14.8	7.5	9.7	17.2 12.2
SATELLITE QUALIFICATION UNIT(S)			36.6			29.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			.7 1.3
TOTAL SATELLITE			39.8			31.4
AVERAGE UNIT COST (2 SATELLITES)						15.7
TOTAL SATELLITE DOT+E AND RECURRING COST						71.2

CC3-1-15 INSAT-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	451904.	139061.	159823.	90287.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1571770.	47819.	54958.	314028.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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CC3-1-13 INSAT-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	94334.	59595.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	698970.	106524.	244884.	139649.
WIRING HARNESS	46.5	1.00	212925.	125260.	152500.	42541.
THERMAL CONTROL	33.3	1.00	531991.	118065.	108295.	106288.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	264.8	1.00	1510062.	1246314.	716274.	301700.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	356155.	94976.
SATELLITE ADAPTER	45.7	1.00	98816.	37004.	33298.	19743.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1072.9

907-111

111

**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-14 INSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 467. ARRAY AREA = 144.0 SQ FT BATT CAP = 28. AMP-HR

✓11-407

SPACECRAFT COST MODEL

CC3-1-14 INSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	2.0	4.9	2.8	4.3	7.1
THERMAL CONTROL	2.9	.2	1.1	.9	.6	1.5
ELECTRICAL POWER	3.6	1.3	4.9	3.8	5.7	9.5
COMMUNICATIONS	1.3	.4	1.7	1.5	1.7	3.2
DATA HANDLING	3.7	.3	3.9	3.5	1.1	4.6
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	17.2	6.2	23.5 16.4	19.6	19.5	39.1 24.6
SATELLITE QUALIFICATION UNIT(S)			39.8			63.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.8			1.6 2.8
TOTAL SATELLITE			43.2			68.1
AVERAGE UNIT COST (4 SATELLITES)						17.0
TOTAL SATELLITE DDT+E AND RECURRING COST						111.3

804-111-408

CC3-1-14 INSAT-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.3	0.0	1.00	77256.	15934.	13778.	18519.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	482322.	139061.	143841.	115618.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1666613.	47819.	49463.	399504.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	71507.	99556.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG CCND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

607-117

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CC3-1-14 INSAT-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	92300.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	71.0	1.00	754917.	118645.	245474.	180961.
WIRING HARNESS	51.9	1.00	233716.	137491.	150652.	56024.
THERMAL CONTROL	36.1	1.00	552877.	124708.	102180.	132530.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	304.9	1.00	1579936.	1405015.	726735.	378727.
POWER CONTROL UNITS	75.0	1.00	508646.	320478.	331531.	121928.
SATELLITE ADAPTER	51.0	1.00	108475.	40134.	31955.	26003.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	225.0					

TOTAL SATELLITE WEIGHT 1170.9

017-111A

120

**** SATELLITE SYSTEMS COST MODEL ****

CC-3-1-16 PALAPA-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1198. ARRAY AREA = 94.0 SQ FT BATT CAP = 100. AMP-HR

VII-411

SPACECRAFT COST MODEL

CC3-1-16 PALAPA-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.8	1.5	6.3	4.6	3.8	8.5
THERMAL CONTROL	1.2	.3	1.5	1.1	.9	2.0
ELECTRICAL POWER	3.0	.9	3.9	3.8	5.1	8.9
COMMUNICATIONS	1.3	.5	1.8	1.8	2.2	4.0
DATA HANDLING	5.6	.3	5.9	5.4	1.1	6.5
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.8	1.0	2.9	2.8	3.5	6.2
SPACECRAFT	22.1	6.0	28.1	25.4	21.0	46.4
MISSION EQUIPMENT			32.1			51.0
SATELLITE			60.2			97.4
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.0			
LAUNCH SITE SUPPORT						1.8
CONTRACTOR FEE			2.1			3.4
TOTAL SATELLITE			64.2			102.6
AVERAGE UNIT COST (4 SATELLITES)						25.6
TOTAL SATELLITE DDT+E AND RECURRING COST						166.8

711-412

CC3-1-16 PALAPA-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVE ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRONCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	771799.	139061.	143841.	185008.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	2543690.	47819.	49463.	609748.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	52576.	21614.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	184514.	118843.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	7440.	5807.

V11-413

CC3-1-16 PALAPA-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	175964.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	65.5	1.00	560061.	110109.	227814.	134252.
WIRING HARNESS	58.9	1.00	260186.	153063.	167715.	62369.
THERMAL CONTRCL	76.6	1.00	700933.	207688.	159671.	168021.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	445524.	250068.
STRUCTURE	156.2	1.00	2209886.	795749.	411596.	529732.
POWER CONTROL UNITS	73.3	1.00	882598.	316208.	327114.	211568.
SOLAR ARRAY DRIVE	10.9	1.00	504592.	223199.	230896.	120956.
SATELLITE ADAPTER	55.0	1.00	115666.	52593.	33398.	27726.
PROPELLANT WEIGHT	218.2					
MISSION EQUIP WEIGHT	500.0					
TOTAL SATELLITE WEIGHT	1548.1					

V11-44

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##. SATELLITE SYSTEMS COST MODEL ##
CC 3-17 IRAN-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 396. ARRAY AREA = 122.0 SQ FT BATT CAP = 24. AMP-HR

VII-415

SPACECRAFT COST MODEL

CC3-1-17 IRAN-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB. AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.7	4.3	1.9	2.9	4.7
THERMAL CONTROL	0.9	1.2	1.0	0.6	0.4	1.0
ELECTRICAL POWER	3.3	1.3	4.6	2.6	4.1	6.7
COMMUNICATIONS	1.2	0.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.4	0.3	3.6	2.4	0.9	3.2
STABILITY AND CONTROL	3.1	0.9	4.0	2.6	2.0	4.7
AUXILIARY PROPULSION	1.5	0.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	16.0	5.4	21.4 14.8	12.5	13.4	26.0 17.2
SATELLITE QUALIFICATION UNIT(S)			36.2 0.0			43.1
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT			1.6			1.6
CONTRACTOR FEE						
TOTAL SATELLITE			39.3			46.1
AVERAGE UNIT COST (3 SATELLITES)						19.4
TOTAL SATELLITE DDT+E AND RECURRING COST						85.5

917-117

170

CC3-1-17 IRAN-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	245557.	251375.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	442047.	139061.	150270.	103696.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1540902.	47819.	51673.	361466.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

711-47

CC3-1-17 IRAN-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	84326.	50609.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	60.2	1.00	672198.	101834.	220109.	157685.
WIRING HARNESS	45.0	1.00	207086.	121825.	139453.	48578.
THERMAL CONTROL	32.2	1.00	513887.	115407.	99841.	120548.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	206812.
STRUCTURE	249.5	1.00	1486609.	1184833.	640240.	348730.
POWER CONTROL UNITS	66.6	1.00	461867.	298965.	323099.	108345.
SATELLITE ADAPTER	43.9	1.00	63665.	35895.	30580.	14935.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					

TOTAL SATELLITE WEIGHT 1038.4

817-11X

** SATELLITE SYSTEMS COST MODEL **

623-118 IRAN-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS.

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 562. APRAY AREA = 174.0 SQ FT BATT CAP = 34. AMP-HR

✓ 611-419

SPACECRAFT COST MODEL

CC3-1-18 IRAN-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.4	5.5	4.8	8.3	13.1
THERMAL CONTROL	1.0	.2	1.2	1.5	1.0	2.5
ELECTRICAL POWER	3.9	1.4	5.3	6.8	10.0	16.7
COMMUNICATIONS	1.2	.4	1.6	2.2	2.6	4.8
DATA HANDLING	3.9	.3	4.2	6.2	1.8	7.9
STABILITY AND CONTROL	3.3	1.3	4.6	8.0	5.9	13.9
AUXILIARY PROPULSION	1.5	.8	2.3	3.1	3.9	7.0
SPACECRAFT MISSION EQUIPMENT	17.9	6.7	24.6 18.5	32.5	33.5	66.0 45.2
SATELLITE QUALIFICATION UNIT(S)			43.1			111.2
GSF (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.8			2.9 4.8
TOTAL SATELLITE			46.6			118.9
AVERAGE UNIT COST (7 SATELLITES)						17.0
TOTAL SATELLITE DDT+E AND RECURRING COST						165.5

VII-420

CC3-1-18 IRAN-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19108.	37186.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	13793.	26045.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12654.	17323.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	388591.	442191.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	161040.	147415.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72688.	62195.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	521124.	139061.	132112.	116854.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1786728.	47819.	45429.	400646.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26827.	10006.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	56375.	78374.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	103867.	56476.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	30978.	7475.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16324.	12873.

✓11-421

CC3-1-18 IRAN-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.1	9.0	.10	36087.	28995.	100841.	59524.

EQUIPMENTS USING CGST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SCLAR ARRAY	85.4	1.00	861847.	140772.	267503.	193256.
WIRING HARNESS	56.7	1.00	251921.	148201.	149145.	56489.
THERMAL CONTRCL	41.5	1.00	571134.	137069.	101822.	128068.
POWER CONVERTERS	15.9	1.00	590016.	367568.	174619.	132302.
PROPULSION FELD SYS	68.3	1.00	881623.	501892.	317909.	197690.
STRUCTURE	378.7	1.00	1673657.	1689266.	802512.	375292.
POWER CONTROL UNITS	77.6	1.00	566841.	326931.	310628.	127105.
SATELLITE ADAPTER	60.3	1.00	125074.	45038.	32370.	28046.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 260.0

TOTAL SATELLITE WEIGHT 1326.3

V11-422

** SATELLITE SYSTEMS COST MODEL **

CC-3-1-20 SIRIO-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 376. ARRAY AREA = 116.0 SQ FT BATT CAP = 22. AMP-HR

V11-423

SPACECRAFT COST MODEL

CC3-1-20 SIRIO-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.6	4.2	1.0	1.9	2.9
THERMAL CONTROL	.9	.2	1.0	.3	.3	.6
ELECTRICAL POWER	3.3	1.2	4.5	1.5	2.8	4.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.3	.3	3.5	1.3	.6	1.9
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	15.8	5.3	21.1 14.2	7.2	9.3	16.6 11.6
SATELLITE QUALIFICATION UNIT(S)			35.3 0.0			28.1
GSE (AGE)			1.5			
LAUNCH SITE SUPPORT						.7
CONTRACTOR FEE			1.6			1.2
TOTAL SATELLITE			38.4			30.1
AVERAGE UNIT COST (2 SATELLITES)						15.0
TOTAL SATELLITE DDT+E AND RECURRING COST						68.5

711-424

CC3-1-20 SIRIO-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTPNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	427738.	139061.	159823.	85459.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1495966.	47819.	54958.	298883.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137053.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

V11-425

CC3-1-20 SIRIO-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
218	BATTERY	2	21.0	0.0	.10	25309.	20430.	74587.	48961.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAP ARRAY	57.1	1.00	648883.	96968.	222916.	129642.
WIRING HARNESS	44.0	1.00	203177.	119525.	145518.	40593.
THERMAL CONTRCL	31.0	1.00	501349.	112473.	103855.	100166.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	233.8	1.00	1454105.	1121153.	644342.	290520.
POWER CONTROL UNITS	66.6	1.00	448075.	298965.	343638.	89522.
SATELLITE ADAPTER	41.7	1.00	60943.	34550.	31560.	12176.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 190.0

TOTAL SATELLITE WEIGHT 996.6

7/5/71

**** SATELLITE SYSTEMS COST MODEL ****
CC3-1-21 NORDSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SFIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 396. ARRAY AREA = 122.0 SQ FT BATT CAP = 24. AHP-HR

V11-427

SPACECRAFT COST MODEL

CC3-1-21 NORCSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.7	4.3	1.1	2.0	3.1
THERMAL CONTROL	.9	.2	1.0	.3	.3	.7
ELECTRICAL POWER	3.3	1.3	4.6	1.5	2.9	4.4
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.6	1.3	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.0	5.4	21.4 14.8	7.3	9.5	16.9 12.2
SATELLITE QUALIFICATION UNIT(S)			36.2 0.0			29.0
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT						.7
CONTRACTOR FEE			1.6			1.2
TOTAL SATELLITE			39.3			31.0
AVERAGE UNIT COST (2 SATELLITES)						15.5
TOTAL SATELLITE DDT+E AND RECURRING COST						70.3

827-111
V11-428

CC3-1-21 NORCSAT-2

* * * * ASSEMBLY DESCRIPTIONS

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	442047.	139861.	159823.	88318.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	1540902.	47819.	54958.	307861.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-429

CC3-1-21 NOROSAT-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	85293.	52559.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	60.2	1.00	672198.	101834.	234101.	134301.
WIRING HARNESS	45.0	1.00	207086.	121825.	148318.	41374.
THERMAL CONTROL	32.2	1.00	513887.	115407.	106188.	102671.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	249.5	1.00	1486609.	1184833.	680940.	297014.
POWER CONTROL UNITS	66.6	1.00	461867.	298965.	343638.	92278.
SATELLITE ADAPTER	43.9	1.00	63665.	35895.	32524.	12720.

PROPELLANT HEIGHT 140.2

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1038.4

VII-430

**** SATELLITE SYSTEMS COST MODEL ****

CC 3-1-22 NORDSAT-2, -34

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 416. ARRAY AREA = 128.6 SQ FT BATT CAP = 28. AMP-HR

VII-431

SPACECRAFT COST MODEL

CC3-1-22 NORDSAT-2, - 34

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.8	1.8	4.6	2.0	3.0	5.0
THERMAL CONTROL	.9	.2	1.1	.6	.4	1.1
ELECTRICAL POWER	3.4	1.3	4.7	2.7	4.3	6.9
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.5	.3	3.8	2.5	.9	3.4
STABILITY AND CONTROL	3.1	.9	4.0	2.6	2.0	4.7
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT	16.5	5.5	22.0	12.9	13.8	26.6
MISSION EQUIPMENT			16.1			18.7
SATELLITE			38.1			45.4
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT						1.1
CONTRACTOR FEE			1.7			1.9
TOTAL SATELLITE			41.3			48.4
AVERAGE UNIT COST (3 SATELLITES)						16.1
TOTAL SATELLITE DDT+E AND RECURRING COST						89.7

VII-432

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15251.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	MUTATION CAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	245557.	251375.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	466276.	139061.	150270.	109379.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1616658.	47819.	51673.	379237.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	37063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG CCND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

11-433

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	93265.	57384.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	697452.	106524.	230248.	163609.
WIRING HARNESS	47.5	1.00	216801.	127541.	145996.	50857.
THERMAL CONTRCL	33.4	1.00	533321.	118305.	102001.	125107.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	68.3	1.00	861623.	501892.	361606.	206812.
STRUCTURE	267.5	1.00	1538272.	1257107.	679294.	360849.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	334867.	111513.
SATELLITE ADAPTER	46.7	1.00	100651.	37809.	31706.	23611.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	220.0					

TOTAL SATELLITE WEIGHT 1097.7

V11-434

**** SATELLITE SYSTEMS COST MODEL ****
CC3-123

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 589. ARRAY AREA = 182.1 SQ FT BATT CAP = 36. AMP-HR

V111435

SPACECRAFT COST MODEL

CC3-1-23 BRZL SAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.5	5.6	1.2	3.0	4.2
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.0	1.4	5.4	1.8	3.5	5.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.9	.3	4.2	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	18.0	6.8	24.8 17.7	9.3	11.7	21.0 15.0
SATELLITE QUALIFICATION UNIT(S)			42.5			36.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			.8 1.5
TOTAL SATELLITE			46.1			38.4
AVERAGE UNIT COST (2 SATELLITES)						19.2
TOTAL SATELLITE DDT+E AND RECURRING COST						84.9

957-11K
411-436

CC3-1-23 BRZL SAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	523586.	139061.	159823.	104609.
403	COMHD DECOD+DISTR	1	2.3	7.5	1.00	1794316.	47819.	54958.	358492.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

V11-437

CC3-1-23 BRZL SAT

ELECTRICAL POWER

DENT TYPE
236 BATTERY

NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR
2	40.3	0.0	.10

D.E. COST
37808.

T.E. COST
32637.

VEHICLE
PROD. COST
119151.

VEHICLE
ENG. COST
73141.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.5	1.00	889705.	147019.	337975.	177757.
WIRING HARNESS	56.8	1.00	252298.	148422.	180700.	50407.
THERMAL CONTROL	42.9	1.00	586940.	140188.	125594.	117267.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	398.5	1.00	1683618.	1764051.	1013825.	336375.
POWER CONTROL UNITS	77.6	1.00	582617.	326931.	375784.	116403.
SATELLITE ADAPTER	62.2	1.00	128416.	45960.	39878.	25657.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 250.0

TOTAL SATELLITE WEIGHT 1395.8

VII-438

**** SATELLITE SYSTEMS COST MODEL ****

CCB-124 BRZL SAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 617. ARRAY AREA = 191.0 SQ FT BATT CAP = 40. AMP-HR

411-439

SPACECRAFT COST MODEL

CC3-1-24 BRZL SAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.2	2.6	5.8	1.3	3.1	4.4
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.1	1.4	5.5	1.9	3.6	5.4
COMMUNICATIONS	1.2	.4	1.6	.7	1.0	1.6
DATA HANDLING	4.1	.3	4.3	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.6	.8	2.4	.9	1.4	2.2
SPACECRAFT	18.4	7.0	25.4	9.5	12.0	21.6
MISSION EQUIPMENT			18.5			15.5
SATELLITE			43.9			37.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.7			
LAUNCH SITE SUPPORT						.8
CONTRACTOR FEE			1.9			1.6
TOTAL SATELLITE			47.6			39.5
AVERAGE UNIT COST (2 SATELLITES)						19.7
TOTAL SATELLITE DDT+E AND RECURRING COST						87.0

077-11A

157

CC3-1-24 BRZL SAT-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	540293.	139061.	159823.	107947.
403	COMMD DECODE+DISTR	1	2.3	7.5	1.00	1845730.	47819.	54958.	368764.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-441

CC3-1-24 BRZL SAT-2

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	124958.	79699.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	93.8	1.00	919960.	153548.	352985.	183802.
WIRING HARNESS	59.4	1.00	262058.	154164.	187690.	52357.
THERMAL CONTRCL	44.4	1.00	604499.	143493.	128144.	120775.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	402132.	182791.
STRUCTURE	420.1	1.00	1727095.	1845002.	1060348.	345061.
POWER CONTROL UNITS	77.6	1.00	598663.	326931.	375784.	119609.
SATELLITE ADAPTER	65.2	1.00	133662.	47825.	40992.	26705.

PROPELLANT WEIGHT 145.0

MISSION EQUIP WEIGHT 260.0

TOTAL SATELLITE WEIGHT 1414.7

VII-442

** SATELLITE SYSTEMS COST MODEL **

CC 3-1-26 NATO 3 -2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 644. ARRAY AREA = 199.0 SQ FT BATT CAP = 40. AMP-HR

VII-443

SPACECRAFT COST MODEL

CC3-1-26 NATO 3-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.8	2.9	6.8	5.3	8.8	14.2
THERMAL CONTROL	1.1	.2	1.3	1.5	1.0	2.4
ELECTRICAL POWER	4.3	1.5	5.8	6.5	9.6	16.1
COMMUNICATIONS	1.2	.4	1.6	2.0	2.4	4.4
DATA HANDLING	5.4	.3	5.7	7.5	1.5	9.0
STABILITY AND CONTROL	3.3	1.3	4.6	7.2	5.2	12.4
AUXILIARY PROPULSION	1.6	.8	2.4	2.8	3.5	6.3
SPACECRAFT	20.7	7.4	28.1	32.8	32.0	64.8
MISSION EQUIPMENT			34.8			84.9
SATELLITE			62.8			149.7
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.9			2.6
LAUNCH SITE SUPPORT			2.1			4.7
CONTRACTOR FEE						
TOTAL SATELLITE			66.8			157.1
AVERAGE UNIT COST (6 SATELLITES						26.2
TOTAL SATELLITE DDT+E AND RECURRING COST						223.9

CC3-1-26 NATO 3-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19561.	38267.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	14120.	26802.
403	ROTATION CAMPER	1	2.8	0.0	1.00	77256.	15984.	12954.	17827.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	397803.	464413.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	164858.	154824.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	738912.	139061.	135244.	170508.
403	COMM D DECD+DISTR	1	2.3	7.5	1.00	2445992.	47819.	46506.	564426.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	106330.	59314.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	44725.	11327.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

VII-445

CC3-1-26 NATO 3-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	120030.	69811.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	97.9	1.00	946766.	159753.	310770.	218472.
WIRING HARNESS	75.8	1.00	322244.	187571.	195302.	74360.
THERMAL CONTROL	47.7	1.00	623692.	150640.	113081.	143920.
POWER CONVERTERS	15.9	1.00	590016.	367568.	178758.	136149.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	340288.	211119.
STRUCTURE	475.2	1.00	2103650.	2048764.	996371.	485429.
POWER CONTROL UNITS	77.6	1.00	613852.	326931.	317992.	141650.
SATELLITE ADAPTER	81.0	1.00	160734.	60021.	39382.	37090.
PROPELLANT WEIGHT	145.0					
MISSION EQUIP WEIGHT	550.0					

TOTAL SATELLITE WEIGHT 1799.4

747-111

**** SATELLITE SYSTEMS COST MODEL ****
CCS-1-28 ETS-4

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 82.1 ARRAY AREA = 25.0 SQ FT BATT CAP = 6. AMP-HR

774-111
774-447

SPACECRAFT COST MODEL

CC3-1-28 ETS-4

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.4	.4	1.8	0.0	.3	.3
THERMAL CONTROL	.7	.1	.7	0.0	.1	.1
ELECTRICAL POWER	1.9	1.0	2.8	0.0	1.0	1.1
COMMUNICATIONS	1.2	.3	1.5	0.0	.4	.4
DATA HANDLING	1.9	.3	2.1	0.0	.3	.3
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	10.9	3.4	14.3 3.4	.2	3.3	3.5 1.4
SATELLITE QUALIFICATION UNIT(S)			17.8			4.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE			1.1			.3 .3
TOTAL SATELLITE			20.0			5.4
AVERAGE UNIT COST (1 SATELLITES)						5.4
TOTAL SATELLITE DDT+E AND RECURRING COST						25.4

877-117

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	234048.	139061.	177581.	0.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	869743.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

677-117

ELECTRICAL POWER

IDENT	TYPE	UNIT NO. WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	11541.	42670.
								17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	12.4	1.00	221617.	23577.	60223.	0.
WIRING HARNESS	20.1	1.00	104553.	61507.	83203.	0.
THERMAL CONTROL	14.5	1.00	383939.	67191.	73984.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.	0.
STRUCTURE	49.7	1.00	804161.	300642.	191981.	0.
POWER CONTROL UNITS	43.5	1.00	183843.	233026.	297606.	0.
SATELLITE ADAPTER	12.9	1.00	11240.	13475.	17653.	0.

PROPELLANT WEIGHT 32.0

MISSION EQUIP WEIGHT 35.0

TOTAL SATELLITE WEIGHT 363.6

11-450

SATELLITE SYSTEMS COST MODEL

CC 3-1-30 CAMSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 571. ARRAY AREA = 176.0 SQ FT BATT CAP = 34. AMP-HR

711-451

SPACECRAFT COST MODEL

CC3-1-30 COMSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DOT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.0	2.4	5.4	1.2	2.9	4.1
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.0	1.4	5.4	1.8	3.4	5.2
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	4.0	.3	4.2	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.7	.9	2.6	.9	1.5	2.4
SPACECRAFT	18.2	6.8	25.0	9.4	11.7	21.1
MISSION EQUIPMENT			17.9			15.0
SATELLITE			42.9			36.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.7			.8
LAUNCH SITE SUPPORT			1.9			1.5
CONTRACTOR FEE						
TOTAL SATELLITE			46.4			38.5
AVERAGE UNIT COST (2 SATELLITES)						19.2
TOTAL SATELLITE DOT+E AND RECURRING COST						84.9

11.2

CC3-1-30 COPSAT-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	526310.	139061.	159823.	105153.
403	CDU	1	12.3	7.5	1.00	1802712.	47819.	54958.	360169.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	44798.

111-453

CC3-1-30 COMSAT-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.2	0.0	.10	36087.	28995.	105854.	69812.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	86.7	1.00	868769.	142755.	328173.	173574.
WIRING HARNESS	60.0	1.00	264301.	155484.	189296.	52805.
THERMAL CONTROL	42.0	1.00	595101.	138187.	124045.	118897.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	82.3	1.00	991943.	578841.	443558.	198183.
STRUCTURE	380.4	1.00	1648244.	1695710.	974548.	329307.
POWER CONTROL UNITS	77.6	1.00	572134.	326931.	375784.	114308.
SATELLITE ADAPTER	60.0	1.00	124545.	44432.	39046.	24883.

PROPELLANT WEIGHT 111.3

MISSION EQUIP WEIGHT 250.0

TOTAL SATELLITE WEIGHT 1307.9

7-54-111N
7-54-574

**** SATELLITE SYSTEMS COST MODEL ****
CBS-1-32 BSE-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1195. ARRAY AREA = 369.0 SQ FT BATT CAP. = 72. AMP-HR

11-45-9

SPACECRAFT COST MODEL

CC3-1-32 BSE-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	3.1	6.4	2.3	5.2	7.5
THERMAL CONTROL	.9	.4	1.3	.7	.9	1.6
ELECTRICAL POWER	5.5	1.4	6.9	4.4	5.8	10.2
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	4.2	.3	4.4	2.9	.9	3.8
STABILITY AND CONTROL	3.1	.9	4.0	2.6	2.0	4.7
AUXILIARY PROPULSION	1.4	.7	2.0	1.3	1.7	3.0
SPACECRAFT MISSION EQUIPMENT	19.5	7.1	26.6 17.4	15.3	17.7	33.0 20.8
SATELLITE QUALIFICATION UNIT(S)			44.1			53.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			1.8
CONTRACTOR FEE			2.0			2.4
TOTAL SATELLITE			47.8			57.5
AVERAGE UNIT COST (3 SATELLITES)						19.2
TOTAL SATELLITE DDT+E AND RECURRING COST						109.4

954-117
11-456

CC3-1-32 BSE-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRONICS	1	7.4	3.3	1.00	1071594.	447818.	245557.	251375.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55133.	52474.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23283.	26809.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	553946.	139061.	150270.	129945.
403	COMMAND DECODE+DISTR	1	2.3	7.5	1.00	1887627.	47819.	51673.	442801.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBAND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

VII-45-7

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	63.2	0.0	.10	66515.	45190.	163109.	123903.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	181.6	1.00	1458694.	283091.	611889.	342181.
WIRING HARNESS	47.1	1.00	215252.	126629.	144952.	50494.
THERMAL CONTROL	115.4	1.00	547016.	274208.	210671.	128319.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	57.0	1.00	788771.	437042.	314882.	185030.
STRUCTURE	509.2	1.00	1805382.	2172712.	1174054.	423508.
POWER CONTROL UNITS	38.4	1.00	881304.	216631.	234119.	206737.
SATELLITE ADAPTER	74.6	1.00	149873.	52868.	41701.	35157.

PROPELLANT WEIGHT 99.3

MISSION EQUIP WEIGHT 245.0

TOTAL SATELLITE WEIGHT 1576.0

857-111

** SATELLITE SYSTEMS COST MODEL **

CC 3-1-33 ECF

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 422. ARRAY AREA = 130.5 SQ FT BATT CAP = 28. AMP-HR

VI-459

SPACECRAFT COST MODEL

CC3-1-33 ECS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.4	0.0	1.2	1.2
THERMAL CONTROL	.9	.2	1.1	0.0	.2	.2
ELECTRICAL POWER	3.4	1.3	4.7	.1	1.7	1.8
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.6
DATA HANDLING	3.4	.3	3.7	0.0	.3	.3
STABILITY AND CONTROL	3.1	.9	4.0	.3	.8	1.1
AUXILIARY PROPULSION	1.7	.9	2.6	.1	.8	.9
SPACECRAFT	16.5	5.6	22.1	.6	5.5	6.1
MISSION EQUIPMENT			13.7			6.3
SATELLITE			35.8			12.4
QUALIFICATION UNIT(S)			0.0			
GSE (ACE)			1.6			
LAUNCH SITE SUPPORT			1.7			.4
CONTRACTOR FEE						.5
TOTAL SATELLITE			39.1			13.2
AVERAGE UNIT COST (1 SATELLITES)						13.2
TOTAL SATELLITE DDT+E AND RECURRING COST						52.3

07-11-460

103-1-33 ECS

* * * * * ASSEMBLY DESCRIPTIONS * * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTPNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	453269.	139061.	177581.	0.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1576042.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36050.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	1053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

107-461

CC3-1-33 ECS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	95535.	62166.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	64.1	1.00	704460.	107923.	275679.	0.
WIRING HARNESS	49.3	1.00	223748.	131627.	178058.	0.
THERMAL CONTROL	33.5	1.00	556556.	118545.	120750.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	82.3	1.00	991943.	578841.	492841.	0.
STRUCTURE	264.4	1.00	1474952.	1244713.	794836.	0.
POWER CONTROL UNITS	70.8	1.00	479373.	309854.	395727.	0.
SATELLITE ADAPTER	44.9	1.00	97343.	36109.	36617.	0.
PROPELLANT WEIGHT	111.3					
MISSION EQUIP WEIGHT	185.0					

TOTAL SATELLITE WEIGHT 1045.7

111-462

*** SATELLITE SYSTEMS COST MODEL ***
CC3-1-35 TELESATC

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 644. ARRAY AREA = 199.0 SQ FT BATT CAP = 40. AMP-HR

VII-463

SPACECRAFT COST MODEL

CC3-1-35 TELESATC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	2.9	6.8	2.7	4.9	7.7
THERMAL CONTROL	1.1	.2	1.3	.7	.5	1.3
ELECTRICAL POWER	4.3	1.5	5.8	3.4	5.3	8.6
COMMUNICATIONS	1.2	.4	1.6	1.1	1.3	2.4
DATA HANDLING	5.4	.3	5.7	3.8	.9	4.7
STABILITY AND CONTROL	3.3	1.3	4.7	4.3	2.9	7.3
AUXILIARY PROPULSION	1.6	.8	2.4	1.5	1.9	3.4
SPACECRAFT MISSION EQUIPMENT	20.7	7.4	28.1 34.8	17.5	17.8	35.3 43.7
SATELLITE QUALIFICATION UNIT(S)			62.9			79.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			1.3 2.6
TOTAL SATELLITE			66.9			82.9
AVERAGE UNIT COST (3 SATELLITES)						27.6
TOTAL SATELLITE DDT+E AND RECURRING COST						149.8

711-11A

174

CC3-1-35 TELESATC

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	28241.	59635.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	739162.	139061.	150270.	173393.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2446735.	47819.	51673.	573957.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	49695.	14075.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

V11-465

CC3-1-35 TELESATC

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	123541.	76742.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	97.9	1.00	946766.	159753.	345299.	222093.
WIRING HARNESS	75.9	1.00	322605.	189783.	217245.	75677.
THERMAL CONTROL	47.7	1.00	624246.	150640.	125646.	146436.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	378097.	214619.
STRUCTURE	477.7	1.00	2118197.	2057922.	1112026.	496888.
POWER CONTROL UNITS	77.6	1.00	613852.	326931.	353324.	143998.
SATELLITE ADAPTER	81.5	1.00	161577.	60520.	43916.	37903.

PROPELLANT WEIGHT 157.3

MISSION EQUIP WEIGHT 550.0

TOTAL SATELLITE WEIGHT 1815.1

997-111

**** SATELLITE SYSTEMS COST MODEL ****

CCS-1-36 TELESATD-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 283. ARRAY AREA = 88.0 SQ FT BATT CAP = 18. AMP-HR

V11-467

SPACECRAFT COST MODEL

CC3-1-36 TELESATD1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.3	4.0	1.9	2.2	4.1
THERMAL CONTROL	.8	.1	.9	.6	.4	.9
ELECTRICAL POWER	2.9	1.1	4.0	2.2	3.4	5.7
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.6	.3	3.9	2.5	.9	3.4
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	16.1	5.3	21.3 20.1	13.9	12.9	26.8 16.4
SATELLITE QUALIFICATION UNIT(S)			41.4 0.0			43.1
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT						1.1
CONTRACTOR FEE			1.6			2.0
TOTAL SATELLITE			44.6			46.2
AVERAGE UNIT COST (3 SATELLITES)						15.4
TOTAL SATELLITE DDT+E AND RECURRING COST						90.8

877-111

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CC3-1-36 TELESATD1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	475834.	139061.	150270.	111622.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1646436.	47819.	51673.	386222.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

VII-469

CC3-1-36 TELESATD1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213	BATTERY	2	17.2	0.0	.10	21490.	17695.	63870.	40032.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	43.0	1.00	534790.	74572.	161184.	125451.
WIRING HARNESS	42.1	1.00	195712.	115134.	131794.	45910.
THERMAL CONTROL	26.4	1.00	470898.	100868.	88890.	110464.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	206812.
STRUCTURE	181.1	1.00	1529875.	902356.	487600.	358879.
POWER CONTROL UNITS	43.7	1.00	379455.	233652.	252514.	89013.
SATELLITE ADAPTER	39.7	1.00	58449.	34666.	28833.	13711.

PROPELLANT WEIGHT 140.0

MISSION EQUIP WEIGHT 290.0

TOTAL SATELLITE WEIGHT 998.0

VII-470

**** SATELLITE SYSTEMS COST MODEL ****
CCB-1-37 TELESAT D

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BDL POWER = 682.1 ARRAY AREA = 211.0 SQ FT BATT CAP = 40. AMP-HR

111-471

SPACECRAFT COST MODEL

CC3-1-37 TELESATD

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	3.0	6.9	4.6	7.7	12.3
THERMAL CONTROL	1.1	.2	1.3	1.3	.8	2.1
ELECTRICAL POWER	4.4	1.5	5.9	5.7	8.4	14.1
COMMUNICATIONS	1.2	.4	1.6	1.7	2.1	3.8
DATA HANDLING	5.5	.3	5.7	6.5	1.3	7.8
STABILITY AND CONTROL	2.9	1.2	4.1	5.8	4.0	9.8
AUXILIARY PROPULSION	1.6	.8	2.4	2.4	3.0	5.4
SPACECRAFT MISSION EQUIPMENT	20.5	7.4	27.9 35.3	28.0	27.3	55.3 68.5
SATELLITE QUALIFICATION UNIT(S)			63.2 0.0			123.8
GSE (AGE)			1.9			
LAUNCH SITE SUPPORT						2.2
CONTRACTOR FEE			2.1			4.0
TOTAL SATELLITE			67.1			130.0
AVERAGE UNIT COST (5 SATELLITES)						26.0
TOTAL SATELLITE DDT+E AND RECURRING COST						197.2

11-472

CC3-1-37 TELESATO

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20111.	39227.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	26131.	53106.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13318.	18275.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	408982.	489954.
803	EARTH SENSOR	3	1.3	0.0	1.00	157133.	77682.	89936.	85443.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73945.	65774.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	747330.	139061.	139044.	176778.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2471039.	47819.	47813.	584516.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	28235.	10555.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	59333.	82677.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	109318.	62576.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	31298.	18275.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	45982.	12067.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17181.	13580.

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CC3-1-37 TELESATD

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	121099.	71865.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	103.6	1.00	986378.	168348.	336692.	233324.
WIRING HARNESS	77.1	1.00	326925.	192324.	203707.	77333.
THERMAL CONTROL	49.7	1.00	623705.	154894.	119086.	147535.
POWER CONVERTERS	15.9	1.00	590016.	367568.	183782.	139566.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	349850.	216417.
STRUCTURE	486.7	1.00	2139643.	2090832.	1045404.	506125.
POWER CONTROL UNITS	81.8	1.00	634789.	337170.	337165.	150157.
SATELLITE ADAPTER	82.8	1.00	163766.	61432.	41013.	38738.
PROPELLANT WEIGHT	157.3					
MISSION EQUIP WEIGHT	560.0					

TOTAL SATELLITE WEIGHT 1844.2

VII-477d

♦♦ SATELLITE SYSTEMS COST MODEL ♦♦
CCS-738

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 416. ARRAY AREA = 128.6 SQ FT BATT CAP = 20% AHP-HR.

VII-475

125

SPACECRAFT COST MODEL

CC3-1-30 UHF

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.8	1.8	4.6	2.7	3.9	6.5
THERMAL CONTROL	.9	.2	1.1	.9	.6	1.4
ELECTRICAL POWER	3.4	1.3	4.7	3.6	5.5	9.1
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.5	.3	3.8	3.4	1.1	4.5
STABILITY AND CONTROL	3.1	.9	4.0	3.5	2.6	6.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	16.5	5.5	22.0 16.1	17.3	17.6	34.9 23.9
SATELLITE QUALIFICATION UNIT(S)			38.1			38.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			1.5
CONTRACTOR FEE			1.7			2.6
TOTAL SATELLITE			41.3			62.9
AVERAGE UNIT COST (4 SATELLITES)						15.7
TOTAL SATELLITE DDT+E AND RECURRING COST						104.2

92-11-476

186

CC3-1-38 UHF

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	235050.	256872.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	466276.	139061.	143841.	111771.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1616658.	47819.	49463.	387529.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIFLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

V11-477

187

CC3-1-38 UHF

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224 BATTERY	2	29.1	0.0	.10	30806.	25839.	92300.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	697452.	106524.	220396.	167186.
WIRING HARNESS	47.5	1.00	216801.	127541.	139749.	51969.
THERMAL CONTROL	33.4	1.00	533321.	118305.	97637.	127842.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	267.5	1.00	1538272.	1257107.	650231.	368739.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	320540.	113952.
SATELLITE ADAPTER	46.7	1.00	100651.	37809.	30350.	24127.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 220.0

TOTAL SATELLITE WEIGHT 1097.7

✓
11-478

108

**** SATELLITE SYSTEMS COST MODEL ****
CC3-F39 CDR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 1414. ARRAY AREA = 111.1 SQ FT BATT CAP = 132. AMP-HR

627-11A

SPACECRAFT COST MODEL

CC3-1-39 CDB

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.4	1.7	7.0	7.4	6.1	13.6
THERMAL CONTROL	1.5	.3	1.8	2.0	1.3	3.3
ELECTRICAL POWER	3.5	1.1	4.5	6.4	8.9	15.3
COMMUNICATIONS	1.3	.5	1.8	2.6	3.3	5.9
DATA HANDLING	6.3	.3	6.6	8.8	1.5	10.3
STABILITY AND CONTROL	4.5	1.9	6.4	10.5	8.2	18.7
AUXILIARY PROPULSION	1.9	1.1	2.9	4.0	5.0	9.1
SPACECRAFT	24.3	6.7	31.0	41.7	34.5	76.2
MISSION EQUIPMENT			34.2			78.0
SATELLITE			65.3			154.2
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.1			
LAUNCH SITE SUPPORT						2.9
CONTRACTOR FEE			2.3			5.5
TOTAL SATELLITE			69.7			162.7
AVERAGE UNIT COST (6 SATELLITES)						27.1
TOTAL SATELLITE DDT+E AND RECURRING COST						232.4

084-111
VII-480

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	35443.	43411.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511828.	508286.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	57426.	50899.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	876915.	139061.	135244.	202353.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2853247.	47819.	46506.	658402.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	49434.	19339.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	173485.	106333.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	44725.	11327.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6995.	5195.

187-11A

CC3-1-39 CDB

ELECTRICAL POWER		UNIT	UNIT	DDTE			VEHICLE	VEHICLE	
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR	D.E. COST	T.E. COST	PROD. COST	ENG. COST
260	BATTERY	4	47.5	0.0	.10	109009.	60591.1	212479.	184720.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	77.3	1.00	629413.	128363.	249706.	145241.
WIRING HARNESS	75.0	1.00	319358.	187873.	193553.	73694.
THERMAL CONTROL	82.9	1.00	855129.	219121.	156247.	197326.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	428978.	245743.
STRUCTURE	179.1	1.00	2467711.	893878.	434718.	569438.
POWER CONTROL UNITS	111.0	1.00	972475.	403090.	392067.	224404.
SOLAR ARRAY DRIVE	12.8	1.00	562670.	255863.	248867.	129839.
SATELLITE ADAPTER	63.8	1.00	131218.	61134.	34250.	30279.

PROPELLANT WEIGHT 270.9

MISSION EQUIP WEIGHT 540.0

TOTAL SATELLITE WEIGHT 1816.1

VII-482

**** SATELLITE SYSTEMS COST MODEL ****

CC3-1-40 OTHER RGL

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 589. ARRAY AREA = 182.1 SQ FT BATT CAP = 36. AMP-HR

VII-483

SPACECRAFT COST MODEL

CC3-1-40. OTHER RGL

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.5	5.6	3.0	5.4	8.3
THERMAL CONTROL	1.0	.2	1.2	1.0	.6	1.6
ELECTRICAL POWER	4.0	1.4	5.4	4.2	6.3	10.6
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.9	.3	4.2	3.8	1.1	4.9
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	18.0	6.8	24.9 17.7	20.5	21.1	41.6 27.0
SATELLITE QUALIFICATION UNIT(S)			42.5			68.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			1.7 3.0
TOTAL SATELLITE			46.1			73.3
AVERAGE UNIT COST (4 SATELLITES)						18.3
TOTAL SATELLITE DDT+E AND RECURRING COST						119.4

CC3-1-40 OTHER RGL

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165 834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRONCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.1	1.00	397432.	153300.	175338.	173039.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	523586.	139061.	143841.	125509.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1794316.	47819.	49463.	430116.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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CC3-1-40 OTHER RGL

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	40.3	0.0	.10	37808.	32637.	116582.	68055.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.5	1.00	889705.	147019.	304179.	213271.
WIRING HARNESS	56.8	1.00	252298.	148422.	162630.	60478.
THERMAL CONTROL	42.9	1.00	586940.	140188.	113034.	140696.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	398.5	1.00	1683618.	1764051.	912444.	403580.
POWER CONTROL UNITS	77.6	1.00	582617.	326931.	338206.	139659.
SATELLITE ADAPTER	62.2	1.00	128416.	45960.	35890.	30783.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	250.0					

TOTAL SATELLITE WEIGHT 1355.8

987-111

**** SATELLITE SYSTEMS COST MODEL ****
CS1-1-1 DSATR WRG

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 4198. ARRAY AREA = 329.7 SQ.FT BATT CAP = 400. AMP-HR

VII-487

SPACECRAFT COST MODEL

CS1-1-1 DSATR WRG

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.9	2.7	10.7	7.6	7.7	15.3
THERMAL CONTROL	2.6	.5	3.1	2.5	1.5	4.0
ELECTRICAL POWER	6.7	2.1	8.8	9.3	12.9	22.2
COMMUNICATIONS	1.4	.5	1.9	2.0	2.5	4.4
DATA HANDLING	9.0	.3	9.3	8.7	1.1	9.8
STABILITY AND CONTROL	4.5	1.9	6.4	7.9	5.9	13.8
AUXILIARY PROPULSION	1.9	1.1	2.9	2.8	3.5	6.3
SPACECRAFT MISSION EQUIPMENT	34.0	9.0	43.0 32.1	40.8	35.0	75.8 51.4
SATELLITE QUALIFICATION UNIT(S)			75.1			127.1
GSE (AGE)			3.0			
LAUNCH SITE SUPPORT			2.7			
CONTRACTOR FEE			3.2			2.4 5.5
TOTAL SATELLITE			81.0			135.0
AVERAGE UNIT COST (4 SATELLITES)						33.7
TOTAL SATELLITE DDT+E AND RECURRING COST						216.0

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7.2.7

CS1-1-1 DSATR WRG

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.1	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.1	72567.	44071.	39474.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.1	503376.	544365.	568085.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.1	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.1	70110.1	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.1	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	1286296.1	139061.	143841.	308338.
403	CDU	1	12.3	7.5	1.00	4527040.1	47819.	49463.	965322.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54652.1	38681.	74151.	31941.
202	ANTENNA	1	3.4	0.0	1.00	349517.1	137063.	61380.	83783.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.1	90576.	184514.	118843.
401	RECEIVER	2	3.9	6.3	1.00	85947.1	42118.	58281.	37421.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.1	43476.	47569.	12967.
605	DIPLEXER	2	.7	.3	1.00	13337.1	5661.	7440.	5807.

CS1-1-1 DSATR WRG

ELECTRICAL POWER		UNIT	UNIT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE	
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR		PROD. COST	ENG. COST	
269	BATTERY	8	71.3	0.0	.10	269075.1	133622.	477306.	484339.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE
		FACTOR			PROD. COST	ENG. COS
SOLAR ARRAY	229.6	1.00	1348121.	351759.	727780.	323158
WIRING HARNESS	125.8	1.00	495171.1	291301.	319185.	118697
THERMAL CONTROL	178.1	1.00	1543525.	368005.	259933.	370022
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	456247.	255279
STRUCTURE	262.3	1.00	3312795.	1236305.	639471.	794111
POWER CONTROL UNITS	298.7	1.00	1837999.	719284.	744090.	440587
SOLAR ARRAY DRIVE	38.1	1.00	1178780.	646645.	668946.	282565
SATELLITE ADAPTER	92.4	1.00	179770.	91507.	45240.	43093

PROPELLANT WEIGHT 271.7

MISSION EQUIP WEIGHT 500.0

TOTAL SATELLITE WEIGHT 2783.7

067-111

**** SATELLITE SYSTEMS COST MODEL ****

CS2-1-1 INMARSAT-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONO PROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APDGE = 19323. NUMBER OF QUAL UNITS = 0
ROL POWER = 522. ARRAY AREA = 161.3 SQ FT BATT CAP = 34.1 AHP-HR

V11-491

SPACECRAFT COST MODEL

CS2-1-1 INMARSAT-1

(MILLIONS OF 1977 DOLLARS)

267-11A

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	2.2	5.1	2.0	3.7	5.7
THERMAL CONTROL	1.0	.2	1.1	.7	.5	1.1
ELECTRICAL POWER	3.8	1.4	5.1	3.0	4.6	7.6
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.6	.3	3.9	2.5	.9	3.4
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	17.2	6.4	23.7 15.0	14.8	15.7	30.5 17.5
SATELLITE QUALIFICATION UNIT(S)			38.7			48.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.8			1.2 2.2
TOTAL SATELLITE			42.1			51.5
AVERAGE UNIT COST (3 SATELLITES)						17.2
TOTAL SATELLITE DDT+E AND RECURRING COST						93.5

CS2-1-1 INMARSAT-1

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	476376.	139061.	150270.	111749.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1648120.	47819.1	51673.	386617.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

VII-11A

CS2-1-1 INMARSAT-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.2	0.0	.10	36087.	28995.	104654.	67222.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	79.3	1.00	817315.	131435.	284091.	19172
WIRING HARNESS	51.8	1.00	233334.	137266.	157129.	5473
THERMAL CONTROL	38.9	1.00	561285.	131187.	111515.	13166
POWER CONVERTERS	15.9	1.00	590016.	367569.	198620.	13840
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	20681
STRUCTURE	340.4	1.00	1579279.	1542901.	833727.	37046
POWER CONTROL UNITS	73.4	1.00	542879.	316461.	342007.	12734
SATELLITE ADAPTER	54.2	1.00	114234.	41312.	34593.	2679
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	205.0					

TOTAL SATELLITE WEIGHT 1209.1

767-111

** SATELLITE SYSTEMS COST MODEL **

CS2-1-2 INMARSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 617. ARRAY AREA = 190.8 SQ FT BATT CAP = 40. AMP-HR

VII-495

SPACECRAFT COST MODEL

CS2-1-2 INMARSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.6	5.7	2.2	4.4	6.6
THERMAL CONTROL	1.0	.2	1.2	.7	.5	1.2
ELECTRICAL POWER	4.1	1.4	5.5	3.2	5.0	8.3
COMMUNICATIONS	1.2	.4	1.6	1.1	1.3	2.4
DATA HANDLING	4.0	.3	4.3	2.8	.9	3.7
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.6	.8	2.4	1.5	1.9	3.4
SPACECRAFT MISSION EQUIPMENT	18.4	7.0	25.3 17.7	15.7	17.0	32.6 21.2
SATELLITE QUALIFICATION UNIT(S)			43.0			53.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			1.3 2.4
TOTAL SATELLITE			46.6			57.4
AVERAGE UNIT COST (3 SATELLITES)						19.1
TOTAL SATELLITE DDT+E AND RECURRING COST						104.0

V11-496

CS2-1-2 INMARSAT-2

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	533277.	139061.	150270.	125096.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1824159.	47819.	51673.	427912.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	49695.	14075.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

V11-497

713

CS2-1-2 INMARSAT-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DCTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	123541.	76742.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DCTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	93.8	1.00	919286.	153548.	331888.	2150.
WIRING HARNESS	58.9	1.00	260186.	153063.	175211.	610.
THERMAL CONTROL	44.3	1.00	603913.	143273.	120326.	1410.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	1380.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	378097.	2140.
STRUCTURE	418.3	1.00	1713715.	1838280.	993339.	4020.
POWER CONTROL UNITS	77.6	1.00	598663.	326931.	353324.	1400.
SATELLITE ADAPTER	64.7	1.00	132790.	47411.	38368.	310.
PROPELLANT WEIGHT	145.0					
MISSION EQUIP WEIGHT	250.0					

TOTAL SATELLITE WEIGHT 1401.8

867-11A

*** SATELLITE SYSTEMS COST MODEL ***
CS2-1-3 INATSAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 758. ARRAY AREA = 59.5 SQ FT BATT CAP = 66. AMP-HR

VII-499

3/5

SPACECRAFT COST MODEL

CS2-1-3 INATSAT

(MILLIONS OF 1977 DOLLARS)

VI-500

SUBSYSTEM COST	DOT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.2	1.3	5.6	4.1	3.4	7.4
THERMAL CONTROL	1.2	.1	1.3	1.1	.5	1.7
ELECTRICAL POWER	2.4	.8	3.1	2.9	4.3	7.2
COMMUNICATIONS	1.5	.6	2.1	2.4	2.7	5.1
DATA HANDLING	5.2	.3	5.4	6.0	1.8	7.7
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.8	1.0	2.9	2.8	3.5	6.2
SPACECRAFT MISSION EQUIPMENT	20.6	5.8	26.3 32.1	25.2	20.4	45.6 44.3
SATELLITE QUALIFICATION UNIT(S)			58.4			89.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.0			1.8 3.3
TOTAL SATELLITE			62.3			95.0
AVERAGE UNIT COST (4 SATELLITES)						23.7
TOTAL SATELLITE DOT+E AND RECURRING COST						157.8

CS2-1-3 INATSAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRONCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	759514.	139061.	258914.	330686.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2278000.	47819.	49463.	546060.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIFLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VII-501

717

CS2-1-3 INATSAT

ELECTRICAL POWER

IDENT TYPE
260 BATTERY

NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST
2	47.5	0.0	.10	61962.

T.E. COST
36770.

VEHICLE
PROD. COST
131346.

VEHICLE
ENG. COST
111532.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	41.4	1.00	406638.	71999.	148964.	97475.
WIRING HARNESS	58.5	1.00	258687.	152181.	166748.	62010.
THERMAL CONTROL	29.3	1.00	699625.	108253.	90436.	167707.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	445524.	250068.
STRUCTURE	152.5	1.00	2019204.	779598.	403294.	484024.
POWER CONTROL UNITS	64.3	1.00	675262.	292881.	302982.	161867.
SOLAR ARRAY DRIVE	6.9	1.00	370088.	151322.	156540.	88714.
SATELLITE ADAPTER	50.6	1.00	107752.	46935.	31808.	25829.
PROPELLANT WEIGHT	218.0					
MISSION EQUIP WEIGHT	450.0					
TOTAL SATELLITE WEIGHT 1373.4						

V11-502

**** SATELLITE SYSTEMS COST MODEL ****

CPL-1 MLTPR P/L

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0
ROL POWER = 4159. ARRAY AREA = 337.7 SQ FT BATT CAP = 100. AMP-HR

VII-503

SPACECRAFT COST MODEL

CP1-1-1 MLTPR P/L

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.4	10.1	14.7	13.9	28.5
THERMAL CONTROL	1.0	.4	1.4	1.9	2.5	4.4
ELECTRICAL POWER	6.4	1.7	8.1	14.0	20.5	34.5
COMMUNICATIONS	.8	.4	1.2	2.5	3.7	6.3
DATA HANDLING	9.9	1.1	11.0	23.3	7.9	31.2
STABILITY AND CONTROL	4.5	1.9	6.4	13.7	11.6	25.3
AUXILIARY PROPULSION	1.5	.9	2.4	4.9	6.2	11.1
SPACECRAFT MISSION EQUIPMENT	31.9	8.7	40.6 4.5	75.1	66.2	141.3 9.4
SATELLITE QUALIFICATION UNIT(S)			45.1 0.0			150.7
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT						5.2
CONTRACTOR FEE			3.0			10.3
TOTAL SATELLITE			50.7			166.1
AVERAGE UNIT COST (9 SATELLITES)						18.5
TOTAL SATELLITE DDT+E AND RECURRING COST						216.8

VII-504

ELECTRICAL POWER

 IDENT TYPE
 269 BATTERY

UNIT	UNIT	DDTE
NO. WEIGHT	POWER	FACTOR
2	71.3	0.0

D.E. COST
86935.T.E. COST
49261.
 VEHICLE
 PROD. COST
 168764.

 VEHICLE
 ENG. COST
 136556.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	235.1	1.00	1370937.	359555.	657641.	289837.
WIRING HARNESS	122.0	1.00	482457.	283822.	274925.	101999.
THERMAL CONTROL	133.9	1.00	594400.	303292.	194473.	125665.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	73.5	1.00	876678.	530870.	323661.	185343.
STRUCTURE	196.6	1.00	3163228.	967594.	442442.	668754.
POWER CONTROL UNITS	189.7	1.00	1827991.	551515.	504371.	386465.
SOLAR ARRAY DRIVE	39.0	1.00	1197588.	659606.	603223.	253188.
SATELLITE ADAPTER	88.4	1.00	173134.	84274.	38972.	36603.

PROPELLANT WEIGHT 165.3

MISSION EQUIP WEIGHT 1000.0

TOTAL SATELLITE WEIGHT 2554.0

V11-505

**** SATELLITE SYSTEMS COST MODEL ****
CPR-1-3 EXOSAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 10800. NUMBER OF QUAL UNITS = 0
BOL POWER = 384. ARRAY AREA = 118.7 SQ FT BATT CAP = 85 AHP-HR

V11-506

271

SPACECRAFT COST MODEL

CP2-1-3 EXOSAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.1	1.4	3.6			1.0
THERMAL CONTROL	.4	.2	.6			.2
ELECTRICAL POWER	3.2	1.1	4.3			1.4
COMMUNICATIONS	.6	.2	.8			.3
DATA HANDLING	3.9	1.3	5.2			.7
STABILITY AND CONTROL	2.7	.7	3.4			.6
AUXILIARY PROPULSION	1.3	.6	1.9			.7
SPACECRAFT MISSION EQUIPMENT	14.3	5.6	19.8 17.7			4.8 8.1
SATELLITE QUALIFICATION UNIT(S)			37.5 0.0			12.9
GSE (AGE)			1.4			
LAUNCH SITE SUPPORT						.3
CONTRACTOR FEE			1.5			.4
TOTAL SATELLITE			40.4			13.6
AVERAGE UNIT COST (1 SATELLITES)						13.6
TOTAL SATELLITE DDT+E AND RECURRING COST						93.9

272

CP2-1-3 EXOSAT

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	379119.	139061.	177581.	0.
333	TAPE RECORDER	1	23.0	8.0	1.00	600466.	749117.	235243.	0.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1342119.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
327	TRANSMITTER	1	4.7	18.0	1.00	163570.	53280.	84368.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
605	DIPLEXER	1	.7	.3	1.00	11988.	3330.	5103.	0.

VII-508

CP2-1-3 EXOSAT

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39719.	22394.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	58.3	1.00	659419.	98854.	252501.	0.
WIRING HARNESS	36.7	1.00	174206.	102482.	138632.	0.
THERMAL CONTROL	31.3	1.00	242017.	113210.	116046.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.1	1.00	749458.	413977.	352471.	0.
STRUCTURE	208.1	1.00	1193541.	1015496.	648465.	0.
POWER CONTROL UNITS	43.7	1.00	453627.	233652.	298406.	0.
SATELLITE ADAPTER	35.3	1.00	52895.	27429.	31810.	0.

PROPELLANT WEIGHT 26.5

MISSION EQUIP WEIGHT 189.0

TOTAL SATELLITE WEIGHT 782.3

609-111

**** SATELLITE SYSTEMS COST MODEL ****

CPZ-15 IRAS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 486. NUMBER OF DUAL UNITS = 0
BOL POWER = 851. ARRAY AREA = 195.2 SQ FT BATT CAP = 18. AMP-HR

015-110

75

SPACECRAFT COST MODEL

CP2-1-5 IRAS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.5	5.2	2.6	2.5	5.1
THERMAL CONTROL	.7	.2	.9	.5	.6	1.0
ELECTRICAL POWER	4.5	1.3	5.9	3.4	4.6	8.0
COMMUNICATIONS	1.2	.4	1.6	1.0	1.1	2.0
DATA HANDLING	5.4	.4	5.8	3.8	1.5	5.3
STABILITY AND CONTROL	5.1	1.7	6.8	5.1	2.8	7.9
AUXILIARY PROPULSION	1.8	.9	2.7	1.6	2.2	3.7
SPACECRAFT MISSION EQUIPMENT	22.4	6.5	28.9 3.4	18.0	15.1	33.1 4.4
SATELLITE QUALIFICATION UNIT(S)			32.3			37.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.2			1.3 2.4
TOTAL SATELLITE			36.4			41.2
AVERAGE UNIT COST (3 SATELLITES)						13.7
TOTAL SATELLITE DDT+E AND RECURRING COST						77.6

CP2-1-5 IRAS

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DESPIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	203095.	308431.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
503	GIMBAL ELECTRONICS	2	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	221001.	550190.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	132477.	153300.	183175.	61140.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	735103.	139061.	150270.	172441.
406	COMMO DECOD+DISTR	1	11.0	5.5	1.00	2434647.	184082.	198921.	571121.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	49802.	97425.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	78763.	46846.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

VII-512

CP2-1-5 IRAS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213	BATTERY	2	17.2	0.0	.10	21490.	17695.	63870.	40032.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	95.9	1.00	934075.	156729.	338762.	219116.
WIRING HARNESS	96.0	1.00	393724.	231621.	265137.	92360.
THERMAL CONTROL	50.5	1.00	414456.	156580.	129909.	97223.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	86.4	1.00	1022627.	600775.	432849.	239888.
STRUCTURE	464.2	1.00	2044281.	1004191.	542628.	479549.
POWER CONTROL UNITS	32.0	1.00	722561.	194715.	210434.	169499.
SATELLITE ADAPTER	78.4	1.00	156338.	57970.	42931.	36674.
PROPELLANT WEIGHT	101.7					
MISSION EQUIP WEIGHT	490.0					

TOTAL SATELLITE WEIGHT 1734.4

VII-513

**** SATELLITE SYSTEMS COST MODEL ****

CP2-1-L FRENCH S/L

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0
POL POWER = 840. ARRAY AREA = 275.4 SQ FT BATT CAP = 18.1 AMP-HR

VII-514

SPACECRAFT COST MODEL

CP2-1-6 FRENCH SC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	1.6	5.6	3.8	3.5	7.3
THERMAL CONTROL	.8	.2	1.0	.8	.8	1.5
ELECTRICAL POWER	5.1	1.6	6.7	5.1	7.5	12.6
COMMUNICATIONS	1.2	.4	1.6	1.4	1.4	2.8
DATA HANDLING	5.6	.4	6.1	8.8	2.8	11.5
STABILITY AND CONTROL	5.1	1.7	6.8	6.8	3.7	10.5
AUXILIARY PROPULSION	1.6	.8	2.4	2.1	2.6	4.6
SPACECRAFT MISSION EQUIPMENT	23.4	6.9	30.3 5.5	28.6	22.2	50.8 5.3
SATELLITE QUALIFICATION UNIT(S)			35.7			56.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.3			1.8 3.7
TOTAL SATELLITE			40.1			61.7
AVERAGE UNIT COST (4 SATELLITES)						15.4
TOTAL SATELLITE DDT+E AND RECURRING COST						101.7

280

CP2-1-6 FRENCH SC

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DESPIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	194406.	315175.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	27032.	56260.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
503	GIMBAL ELECTRONCS	2	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTROL ELECTRONCS	2	7.4	3.5	1.00	1192148.	761291.	211546.	519051.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	132477.	153300.	175338.	57680.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	54563.	50706.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23042.	25906.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	770932.	139061.	143841.	184800.
406	COMM DECOD+DISTR	2	11.0	5.5	1.00	2541120.	184082.	342739.	1106382.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	47671.	99556.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	75393.	44195.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VII-516

CP2-1-6 FRENCH SC

ELECTRICAL POWER

IDENT TYPE	UNIT	UNIT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE
	NO.	WEIGHT	POWER	FACTOR		PROD. COST	ENG. COST
213 BATTERY	2	17.2	0.0	.10	21490.	17695.	63209.
							38683.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE
		FACTOR			PROD. COST	ENG. COST
SOLAR ARRAY	135.4	1.00	1188558.	215707.	446292.	284909.
WIRING HARNESS	114.6	1.00	457525.	269154.	294918.	109673.
THERMAL CONTROL	56.4	1.00	460360.	168761.	132654.	110353.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	75.2	1.00	940593.	540233.	372580.	225470.
STRUCTURE	525.9	1.00	2153052.	1116567.	577537.	516109.
POWER CONTROL UNITS	73.5	1.00	717082.	316713.	327635.	171892.
SATELLITE ADAPTER	86.1	1.00	169297.	63103.	43409.	40582.
PROPELLANT WEIGHT	99.3					
MISSION EQUIP WEIGHT	480.0					

TOTAL SATELLITE WEIGHT 1898.5

VII-517

**** SATELLITE SYSTEMS COST MODEL ****
CPR-1-7 EUROPE SIC

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APDGE = 19323. NUMBER OF QUAL UNITS = 0
BOL POWER = 108. ARRAY AREA = 33.4 SQ FT BATT CAP = 8. AMP-HR

VII-518

SPACECRAFT COST MODEL

CP2-1-7 EUROPE SC

(MILLIONS OF 1977 DOLLARS)

VII-519

SUBSYSTEM COST	DOT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.6	.5	2.1	2.8	1.9	4.7
THERMAL CONTROL	.7	.1	.8	1.2	.6	1.8
ELECTRICAL POWER	2.1	1.0	3.1	3.8	6.6	10.4
COMMUNICATIONS	1.2	.3	1.5	2.0	2.3	4.3
DATA HANDLING	2.3	.3	2.6	4.0	2.0	6.0
STABILITY AND CONTROL	2.7	.7	3.4	4.6	3.3	7.9
AUXILIARY PROPULSION	1.3	.6	1.9	3.0	3.7	6.8
SPACECRAFT MISSION EQUIPMENT	11.8	3.5	15.3 11.8	21.5	20.4	41.9 29.1
SATELLITE QUALIFICATION UNIT(S)			27.1 0.0			71.0
GSE (AGE)			1.2			2.4
LAUNCH SITE SUPPORT						3.1
CONTRACTOR FEE			1.2			
TOTAL SATELLITE			29.5			76.4
AVERAGE UNIT COST (8 SATELLITES)						9.6
TOTAL SATELLITE DOT+E AND RECURRING COST						105.9

189

CP2-1-7 EUROPE SC

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	ODTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	18724.	36101.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	13516.	25285.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12400.	16818.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447318.	211546.	233281.
803	EARTH SENSOR	1	1.3	0.0	1.00	126272.	32368.	32934.	27924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	ODTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72127.	60647.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	ODTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	292892.	139061.	129457.	63761.
403	COMM. DECODE+DISTR	1	2.3	7.5	1.00	1064132.	47819.	44516.	231657.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	ODTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
103	BASEBAND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26288.	9714.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	55242.	76088.
306	TRANSMITTER	1	2.1	10.9	1.00	136863.	28105.	56544.	29794.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29140.	16818.
503	COMMAND SIG COND	1	1.5	.3	1.00	18115.	18115.	16864.	3944.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15996.	12498.

VII-520

CP2-1-7 EUROPE SC

ELECTRICAL POWER

IDENT	TYPE	UNIT	UNIT	DDTE	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
204	BATTERY	8.6	0.3	.10	11097.	10743.	37074.	17849.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	16.4	1.00	271436.	30544.	55876.	59091.
WIRING HARNESS	23.7	1.00	120230.	70729.	69750.	26174.
THERMAL CONTROL	15.7	1.00	400432.	70913.	56503.	87172.
POWER CONVERTERS	15.9	1.00	590016.	367563.	171110.	128444.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	256582.	162953.
STRUCTURE	54.3	1.00	937615.	324135.	150892.	204115.
POWER CONTROL UNITS	53.5	1.00	215982.	263011.	244874.	47018.
SATELLITE ADAPTER	16.2	1.00	13642.	16385.	14703.	2970.

PROPELLANT WEIGHT 26.5

MISSION EQUIP WEIGHT 100.0

TOTAL SATELLITE WEIGHT 448.0

VII-521

286

**** SATELLITE SYSTEMS COST MODEL ****

CPR-1-B CANADA SC

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 19373. NUMBER OF QUAL UNITS = 0
BOL POWER = 107. ARRAY AREA = 33.0 SQ FT BATT CAP = 8. AMP-HR

VII-522

SPACECRAFT COST MODEL

GP2-1-8 CANADA SC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.9	.5	2.5	3.1	2.0	5.0
THERMAL CONTROL	.8	.1	.9	1.2	.6	1.8
ELECTRICAL POWER	2.1	1.1	3.1	3.5	6.1	9.6
COMMUNICATIONS	1.2	.4	1.6	2.2	2.6	4.8
DATA HANDLING	2.0	.3	2.3	4.0	1.8	5.8
STABILITY AND CONTROL	3.1	.9	4.0	5.6	4.2	9.8
AUXILIARY PROPULSION	1.4	.7	2.1	2.9	3.5	6.4
SPACECRAFT MISSION EQUIPMENT	13.1	3.9	17.0 13.6	22.4	20.8	43.1 33.4
SATELLITE QUALIFICATION UNIT(S)			30.6 0.0			76.6
GSE (AGE)			1.3			
LAUNCH SITE SUPPORT						2.2
CONTRACTOR FEE			1.3			3.2
TOTAL SATELLITE			33.2			82.0
AVERAGE UNIT COST (7 SATELLITES)						11.7
TOTAL SATELLITE DDT+E AND RECURRING COST						115.2

Y11-52.3

2/11/78

CP2-1-8 CANADA SC

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVEN ASSY	1	1.0	5.9	1.00	165334.	15851.	19108.	37186.
303	SUN SENSOR	1	.3	.0	1.00	115150.	14519.	13793.	26045.
403	ROTATION DAMPER	1	2.4	3.0	1.00	77256.	15984.	12654.	17323.
603	CONTROL ELECTRONICS	1	7.4	7.5	1.00	1071594.	447819.	215883.	240288.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	161040.	147415.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45752.	72688.	62195.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	330121.	139061.	132112.	74025.
403	COMM DECOD+DIST	1	2.3	7.5	1.00	1185044.	47819.	45429.	265728.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26827.	10006.
202	ANTENNA	1	9.4	0.0	1.00	349517.	137063.	56375.	78374.
306	TRANSMITTER	1	2.1	10.9	1.00	152260.	47779.	103867.	56476.
401	RECEIVER	1	3.3	6.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	30978.	7475.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16324.	12873.

VII-524

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CP2-1-3 CANADA SC

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	9.0	.10	11097.	10743.	37363.	18304.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	16.2	1.00	263157.	30199.	57386.	60354.
WIRING HARNESS	28.4	1.00	149165.	82457.	82982.	31430.
THERMAL CONTROL	15.6	1.00	445174.	70606.	57446.	99823.
POWER CONVERTERS	15.3	1.00	590016.	367568.	174619.	132302.
PROPULSION FEED SYS	58.9	1.00	801709.	448143.	283863.	179771.
STRUCTURE	65.0	1.00	1112792.	377679.	179422.	249526.
POWER CONTROL UNITS	58.5	1.00	214810.	277124.	263304.	48168.
SATELLITE ADAPTER	20.4	1.00	33189.	20605.	17171.	7442.

PROPELLANT WEIGHT 84.3

MISSION EQUIP WEIGHT 125.0

TOTAL SATELLITE WEIGHT 571.4

VII-525

**** SATELLITE SYSTEMS COST MODEL ****

CP2-1-14 ASTROA

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 270. NUMBER OF QUAL UNITS = 0
BOL POWER = 150. ARRAY AREA = 34.5 SQ FT BATT CAP = 6. AMP-HR

VII-526

SPACECRAFT COST MODEL

CP2-1-14 ASTRO A

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----	DOT+E	-----	-----	-----	RECURRING	-----
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FA9 AND ASSEMBLY	TOTAL RECURRING	
STRUCTURE	1.7	.5	2.1	0.0	.3	.3	
THERMAL CONTROL	.4	.1	.5	0.0	.1	.1	
ELECTRICAL POWER	2.2	1.1	3.2	.0	1.2	1.2	
COMMUNICATIONS	1.2	.4	1.6	0.0	.3	.3	
DATA HANDLING	2.4	.3	2.7	0.0	.3	.3	
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6	
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7	
SPACECRAFT	11.8	3.6	15.5	.2	3.5	3.6	
MISSION EQUIPMENT			11.2			4.8	
SATELLITE			26.7			8.4	
QUALIFICATION UNIT(S)			0.0				
GSE (AGE)			1.2				
LAUNCH SITE SUPPORT						.3	
CONTRACTOR FEE			1.2			.3	
TOTAL SATELLITE			29.1			9.0	
AVERAGE UNIT COST (1 SATELLITES)						9.0	
TOTAL SATELLITE DOT+E AND RECURRING COST						38.1	

VII-527

CP2-1-14 ASTRO A

* * * * * ASSEMBLY DESCRIPTIONS * * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.3	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	118150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.3	0.0	1.00	77256.	15994.	17010.	0.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	123272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	385418.	139061.	177581.	0.
403	COMM DECOD+DISTP	1	2.3	7.5	1.00	1104977.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.3	1.00	44622.	16117.	36060.	0.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	58853.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.0	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-528

CP2-1-14 ASTRO A

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	3.5	0.0	.10	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	17.0	1.00	277664.	31574.	80658.	
WIRING HARNESS	26.2	1.00	130902.	77007.	104171.	
THERMAL CONTROL	16.4	1.00	265591.	73041.	79510.	
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.	
STRUCTURE	53.0	1.00	967035.	327684.	209249.	
POWER CONTROL UNITS	68.2	1.00	261745.	303325.	388155.	
SATELLITE ADAPTER	16.7	1.00	13999.	17937.	20531.	
PROPELLANT WEIGHT	26.5					
MISSION EQUIP WEIGHT	95.0					

TOTAL SATELLITE WEIGHT 466.8

VII-529

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**** SATELLITE SYSTEMS COST MODEL ****
CPR-1-15 ASTRO B

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE = 270. NUMBER OF QUAL UNITS = 0
PDL POWER = 144. ARRAY AREA = 37.7 SQ FT BATT CAP = 6. AMP-HR

VII-530

SPACECRAFT COST MODEL

CP2-1-15 ASTRO B

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.7	.5	2.2	0.0	.3	.3
THERMAL CONTROL	.5	.1	.6	0.0	.1	.1
ELECTRICAL POWER	2.2	1.1	3.3	.0	1.2	1.3
COMMUNICATIONS	1.2	.4	1.6	0.0	.3	.3
DATA HANDLING	2.4	.3	2.7	0.0	.3	.3
STABILITY AND CONTROL	3.0	.5	3.8	0.0	.7	.7
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	12.3	3.8	16.1 .6	.2	3.7	3.8 .3
SATELLITE QUALIFICATION UNIT(S)			16.7 0.0			4.1
GSE (AFE)			1.3			
LAUNCH SITE SUPPORT						.3
CONTRACTOR FEE			1.2			.3
TOTAL SATELLITE			19.2			4.7
AVERAGE UNIT COST (1 SATELLITES)						4.7
TOTAL SATELLITE DDT+E AND RECURRING COST						23.9

VII-531

CP2-1-15 ASTRO B

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	120258.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	305344.	139061.	177581.	0.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1104738.	47819.	61055.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	58853.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-532

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CP2-1-15 ASTRO B

ELECTRICAL POWER

IDENT	TYPE	UNIT NO. WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	18.5	1.00	295450.	34150.	87228.	0.
WIRING HARNESS	27.7	1.00	137230.	80730.	109207.	0.
THERMAL CONTROL	17.0	1.00	268823.	74843.	81199.	0.
POWER CONVERTERS	15.9	1.00	590016.	367563.	234718.	0.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.	0.
STRUCTURE	60.0	1.00	969357.	352839.	225312.	0.
POWER CONTROL UNITS	73.5	1.00	275771.	316713.	404486.	0.
SATELLITE ADAPTER	17.0	1.00	14212.	17265.	20746.	0.

PROPELLANT WEIGHT 26.5

MISSION EQUIP WEIGHT 85.0

TOTAL SATELLITE WEIGHT 473.5

VII-533

**** SATELLITE SYSTEMS COST MODEL ****

CP2-1-16 JAPAN S/C

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION
APOGEE * 270. NUMBER OF QUAL UNITS * 0
BOL POWER * 882. ARRAY AREA * 71.6 SQ FT BATT CAP * 20. AMP-HR

VII-534

SPACECRAFT COST MODEL

CP2-1-16 JAPAN SC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	.9	4.2	8.6	7.0	15.6
THERMAL CONTROL	.4	.1	.6	1.1	1.3	2.4
ELECTRICAL POWER	2.3	.6	3.0	6.8	9.9	16.7
COMMUNICATIONS	.6	.3	.9	2.2	3.7	5.9
DATA HANDLING	3.9	.3	4.2	10.2	3.2	13.4
STABILITY AND CONTROL	4.2	1.6	5.8	14.0	12.6	26.5
AUXILIARY PROPULSION	1.0	.6	1.6	5.0	6.4	11.4
SPACECRAFT MISSION EQUIPMENT	15.9	4.3	20.2	47.8	44.1	91.9
			29.7			139.6
SATELLITE QUALIFICATION UNIT(S)			49.9			231.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.5			
CONTRACTOR FEE			1.5			5.1
						6.8
TOTAL SATELLITE			53.0			243.4
AVERAGE UNIT COST (14 SATELLITES)						17.4
TOTAL SATELLITE DDT+E AND RECURRING COST						296.4

✓11-535

CP2-1-16 JAPAN SC

* * * * ASSEMBLY DESCRIPTIONS * * * *

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1305	REACTION WHEEL	1	5.0	25.0	1.00	98701.	39694.	16970.	18305.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	25830.	17675.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	249987.	217512.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	339483.	332752.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	91289.	71403.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	38552.	31818.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	520991.	139061.	118901.	96623.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1786317.	47819.	40886.	331290.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	43460.	14302.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	10865.	15925.
303	TRANSMITTER	2	2.2	10.2	1.00	105063.	49590.	64165.	30270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	26764.	14328.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	27880.	5806.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	14692.	10647.

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CP2-1-16 JAPAN SC

ELECTRICAL POWER

IDENT	TYPE	QO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
215	BATTERY	2	13.9	0.0	.10	23417.	15140.	50268.	33250.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	49.9	1.00	462897.	85591.	146380.	85849.
WIRING HARNESS	31.4	1.00	152624.	89786.	81323.	28306.
THERMAL CONTROL	22.1	1.00	251084.	89413.	63386.	46566.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	40.7	1.00	576982.	337768.	192555.	107007.
STRUCTURE	75.2	1.00	1480650.	427496.	182780.	274601.
POWER CONTROL UNITS	52.4	1.00	737844.	259834.	222189.	136840.
SOLAR ARRAY DRIVE	8.3	1.00	419470.	177050.	151399.	77795.
SATELLITE ADAPTER	31.6	1.00	48144.	29797.	19963.	8929.
PROPELLANT WEIGHT	29.2					
MISSION EQUIP WEIGHT	400.0					
TOTAL SATELLITE WEIGHT	847.4					

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CP2-1-16 JAPAN SC

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
215	BATTERY	2	13.9	0.0	.10	23417.	15140.	50268.	33250.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	49.9	1.00	462897.	85591.	146380.	85849
WIRING HARNESS	31.4	1.00	152624.	89786.	81323.	28306
THERMAL CONTROL	22.1	1.00	251084.	89413.	63386.	46566
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	40.7	1.00	576982.	337768.	192555.	107007
STRUCTURE	75.2	1.00	1480650.	427496.	182780.	274601
POWER CONTROL UNITS	52.4	1.00	737844.	259834.	222189.	136840
SOLAR ARRAY DRIVE	8.3	1.00	419470.	177050.	151399.	77795
SATELLITE ADAPTER	31.6	1.00	48164.	29797.	19963.	8929
PROPELLANT WEIGHT	29.2					
MISSION EQUIP WEIGHT	400.0					
TOTAL SATELLITE WEIGHT	847.4					

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Appendix VIII

Mission Cost Model (MISSCM)

Payload and Launch Vehicle Fiscal Year Data

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1

2

2

2

NC1-1-2

2

2

2

NC1-1-3

3

4

3

NC1-1-4

5

5

SUBTOTAL

2

2

3

2

5

2

4

2

5

2

3

GOVERNMENT TO PEOPLE LINKS

NC2-1-1

1

1

1

NC2-1-2

50

SUBTOTAL

1

1

50

1

INTRAGOVERNMENT LINKS

NC4-1-1

5

5

5

NC4-1-2

15

15

15

NC4-2-1

2

2

2

NC4-2-2

5

5

5

SUBTOTAL

2

5

5

15

2

5

5

15

5

2

15

5

PLANETARY

NL1-1-1

NL1-1-2

1

2

NL1-1-3

1

NL1-1-4

1

NL1-1-5

2

1

NL1-1-6

NL1-1-7

1

1

NL1-1-8

NL1-1-9

1

NL1-1-10

1

NL1-1-11

1

NL1-1-12

2

SUBTOTAL

4

2

1

1

3

2

1

1

LUNAR

NL2-1-1

1

SUBTOTAL

1

EARTH RESOURCES MONITORING

NO1-1-1

1

2

1

1

2

1

NO1-1-2

1

1

1

2

1

1

NO1-1-3

1

1

1

2

NO1-1-4

NO1-1-5

NO1-1-6

1

NO1-1-7

1

1

1

1

NO1-1-8

1

1

1

NO1-2-1

1

2

2

1

2

3

2

2

3

1

3

1

4

1

SUBTOTAL

1

2

2

1

2

3

2

2

3

1

3

1

4

1

VIII-1

C-12

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING																		
	NO2-1-1		3															
	NO2-1-2			2		2			1			2						
	NO2-1-3	1																
	NO2-1-4							1		2		1					2	
	NO2-1-5																	
	NO2-2-1																	
	NO2-2-2																	
	SUBTOTAL	1	3	2		2	1		3		1	2					2	
ASTROPHYSICS																		
	NP1-1-1			2			1					2						
	NP1-1-2			3	2	3			3									
	NP1-1-3					3	2			3		3						
	NP1-1-4A																	
	NP1-1-4B																1	
	NP1-1-5						1			1								
	NP1-1-6							1										
	NP1-1-7									1								
	NP1-1-8																	
	NP1-2-1																	
	NP1-2-2																	
	NP1-2-3																	
	NP1-2-4																	
	SUBTOTAL			3	2	2	3	4	4		4	4		5	1			
SOLAR TERRESTRIAL																		
	NP2-1-1				1		1		1		1		1		1		1	
	NP2-1-2																	
	NP2-1-3	1			1		1		1		1	1		1		1	1	
	NP2-1-4		1			1		1		1		1		1		1		
	NP2-1-5										1		1					
	NP2-2-1										3							
	NP2-2-2																	
	NP2-2-3																	
	NP2-2-4																	
	SUBTOTAL	1	1		1	1	2	1	1	2	1	5	2	1	2	1	2	1
LIFE SCIENCES																		
	NP3-1-1			1	1	2	2											
	NP3-1-2		1															
	NP3-2-1																	
	NP3-2-2																	
	NP3-2-3																	
	NP3-2-4																	
	NP3-3-1																	
	SUBTOTAL		1	1	1	2	2										5	5

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA (CONTINUED)																							
SPACE PROCESSING-SPACE STATION																							
NS1-2-1																						6	
SUBTOTAL																						6	
ORBITAL OPERATIONS																							
NS3-1-1								10		10		10					10		10	10			
NS3-1-2																							
NS3-1-3							25																
NS3-1-4																							
NS3-1-5																							
NS3-1-6																							
SUBTOTAL							25	10		10		10					10		10	10			
SATELLITE POWER																							
NS4-1-1												25											
NS4-1-2																250							
NS4-1-3																						2000	4000
SUBTOTAL												25				250						2000	4000
TOTAL																							
NASA							30	18	11	18	15	22	54	16	10	262	41	14	22	72	29	2019	4009

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1 1 5

SUBTOTAL 1 5

US DOMESTIC COMMUNICATION

CC2-1-1 2 2 1 1 2 1 2

CC2-1-2 1

CC2-1-4 1

CC2-1-5 1

CC2-1-6 1 2 1 2 1 1

CC2-1-7 1

CC2-1-8 1

CC2-1-9 1

CC2-1-11 1

CC2-1-12 2 4

SUBTOTAL 2 2 2 2 3 1 1 3 2 1 4 5 2 4 4

FOREIGN COMMUNICATION

CC3-1-1 1

CC3-1-2 1

CC3-1-4 1

CC3-1-5 1

CC3-1-6 1

CC3-1-10

CC3-1-11

CC3-1-12

CC3-1-13 1

CC3-1-14 1

CC3-1-16 1 1 2 1 1

CC3-1-17 1 1 1 1

CC3-1-18 1 1 1 1

CC3-1-20 1 1

CC3-1-21 1

CC3-1-22 1

CC3-1-23 1

CC3-1-24 1

CC3-1-26 1 1 1 1

CC3-1-28 1 1

CC3-1-30 1 1

CC3-1-32 1 1 2

CC3-1-33 1

CC3-1-35 1 1

CC3-1-36 1

CC3-1-37 1 1 1

CC3-1-38 1 1 1

CC3-1-39 1 2 1 2 1 1

CC3-1-40 1 1 5 4 3 4 1 2 3 4 2 3 5 4 3 3 4

SUBTOTAL 1 1 5 4 3 4 1 2 3 4 2 3 5 4 3 3 4

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1																1		1		2		
CO1-1-2							1															
CO1-2-1											4						3					
SUBTOTAL							1				4				1		4		2			

EARTH AND OCEAN MONITORING

CO2-1-1																8	4		8	5	
SUBTOTAL																8	4		8	5	

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1								2	1	2	1	4	3	3	3	5	5	5			
CO3-2-1								2			1										
CO3-2-2														2			1				
CO3-2-3								1													
SUBTOTAL								5	1	2	2	4	3	5	3	5	6	5			

WEATHER

CO4-1-2			1	1	2	1	1	1	1	2											
CO4-1-3											2	1	2	1	2	1	2	1			
CO4-2-2											1									1	
SUBTOTAL			1	1	2	1	1	1	1	2	3	1	2	1	2	1	2	1	1		

US DOMESTIC

CP1-1-1											4	4	4	5	4	4	4	4	4		
SUBTOTAL											4	4	4	5	4	4	4	4	4		

FOREIGN

CP2-1-3							1					1					1				
CP2-1-5													1								
CP2-1-6									1				1						1		
CP2-1-7														1							
CP2-1-8																1					
CP2-1-14																					
CP2-1-15																					
SUBTOTAL							1			1		1	1		1	2	1		1		

USERS TOTAL

OUTSIDE					1	4	11	5	8	13	6	17	12	15	15	17	25	27	17	17	14	12	8
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ALL PROGRAMS

TOTAL					1	4	53	36	30	55	43	60	140	61	50	315	143	131	105	172	124	2116	4106
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TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1	110																				
NC1-1-2									110										110		
NC1-1-3										190				190						190	
NC1-1-4											280							280			
SUBTOTAL	110								110	190		280	110	190			110	280	110	190	

GOVERNMENT TO PEOPLE LINKS

NC2-1-1											60					60				60
NC2-1-2																		1380		
SUBTOTAL											60					60		1380		60

INTRAGOVERNMENT LINKS

NC4-1-1										280				280				280			
NC4-1-2											690					690			690		
NC4-2-1												110						110			
NC4-2-2										280						280				280	
SUBTOTAL										280	280	690	110	280	280	690		280	110	690	280

PLANETARY

NL1-1-1																					
NL1-1-2											80							80			
NL1-1-3												40								40	
NL1-1-4										30	30								30	30	
NL1-1-5											120								60		
NL1-1-6																					
NL1-1-7												50								50	
NL1-1-8																					
NL1-1-9														40							
NL1-1-10																40					
NL1-1-11																	30				
NL1-1-12																		90			
SUBTOTAL										30	230	90		40		40	120		80	90	120

LUNAR

NL2-1-1	30																			
SUBTOTAL	30																			

EARTH RESOURCES MONITORING

NO1-1-1	70									70						70			70		70	
NO1-1-2											70							70		70		
NO1-1-3												60				60			70		60	
NO1-1-4																						
NO1-1-5														30								
NO1-1-6														30								
NO1-1-7												60				60				60		
NO1-1-8													70						70			
NO1-2-1																						
SUBTOTAL	70	120								70	70	130	200	60	130	140	130	60	140	70	190	70

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TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING

NO2-1-1		190								
NO2-1-2			100		100		100		100	
NO2-1-3	- 70									
NO2-1-4					80		80		80	80
NO2-1-5			40							
NO2-2-1										
NO2-2-2										
SUBTOTAL		70	190	140	100	80	180	80	100	80

ASTROPHYSICS

NP1-1-1					90			90						90		
NP1-1-2				150		150		150			150					
NP1-1-3							150		150			150		150		
NP1-1-4A								30					30			
NP1-1-4B										60				60		
NP1-1-5							30		30		30					
NP1-1-6					60			60								
NP1-1-7												120				
NP1-1-8		20		20												
NP1-2-1																
NP1-2-2																
NP1-2-3																
NP1-2-4																
SUBTOTAL		20		170	150	150	150	210	300	30	60	180	270	30	240	60

SOLAR TERRESTRIAL

NP2-1-1					50		50		50		50		50		50		50		50
NP2-1-2					30														
NP2-1-3		50	50	50	50	50	50	100	100	100	100	100	100	100	100	100	100	100	100
NP2-1-4		30	30	30	30	30	30	60	60	60	60	60	60	60	60	60	60	60	60
NP2-1-5												150							
NP2-2-1																			
NP2-2-2																			
NP2-2-3																			
NP2-2-4																			
SUBTOTAL		80	80	80	80	160	80	130	160	210	160	210	310	210	160	210	160	210	160

LIFE SCIENCES

NP3-1-1		60	60	120	60	
NP3-1-2	60					
NP3-2-1						
NP3-2-2						
NP3-2-3						
NP3-2-4						
NP3-3-1						290
SUBTOTAL	60	60	60	120	60	290

TOTAL SOL APRAY LBS BY FISCAL YEAR THROUGH 1996

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA (CONTINUED)																							
SPACE PROCESSING-SPACE STATION																							
NS1-2-1																						310	
SUBTOTAL																						310	
ORBITAL OPERATIONS																							
NS3-1-1							550		550	550					550		550	550					
NS3-1-2																							
NS3-1-3						820																	
NS3-1-4																							
NS3-1-5																							
NS3-1-6																							
SUBTOTAL						820	550		550	550					550		550	550					
SATELLITE POWER																							
NS4-1-1										820													
NS4-1-2															3100								
NS4-1-3																						2215044300	
SUBTOTAL										820					3100							2215044300	
TOTAL																							
NASA						80	1130	1060	710	1170	920	1190	2370	1180	680	3970	2150	840	1360	2660	1600	2332044900	

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996
(000' OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

HASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1							1										1					
NC1-1-2								1											1			
NC1-1-3										1										1		
NC1-1-4											1							1				
SUBTOTAL							1		1	1			1				1	1	1	1		

GOVERNMENT TO PEOPLE LINKS

NC2-1-1												1									1	
NC2-1-2																			2			
SUBTOTAL												1							2	1		

INTRAGOVERNMENT LINKS

NC4-1-1										1				1								
NC4-1-2											1					2				1		
NC4-2-1						1																
NC4-2-2							1								1					1		
SUBTOTAL						1		1		1		1		1	1	2			1	1		

PLANETARY

NL1-1-1																						
NL1-1-2											1								1			
NL1-1-3																						
NL1-1-4																				1		
NL1-1-5										1												
NL1-1-6																						
NL1-1-7																						
NL1-1-8																					1	
NL1-1-9																						
NL1-1-10																						
NL1-1-11																						
NL1-1-12																	1					
SUBTOTAL											2						1		1	1	1	

LUNAR

NL2-1-1																						
SUBTOTAL																						

EARTH RESOURCES MONITORING

NO1-1-1										1												1
NO1-1-2																1						
NO1-1-3																						
NO1-1-4																						
NO1-1-5																						
NO1-1-6																						
NO1-1-7														1							1	
NO1-1-8																						
NO1-2-1																			1			
SUBTOTAL										1		1			2				1	1	1	

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996
(000's OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING																						
NO2-1-1							1															
NO2-1-2												1										
NO2-1-3																						
NO2-1-4																1					1	
NO2-1-5																						
NO2-2-1																						
NO2-2-2																						
SUBTOTAL							1				1					1					1	
ASTROPHYSICS																						
NP1-1-1																						
NP1-1-2																						
NP1-1-3																						
NP1-1-4A											1		1							1		
NP1-1-4B																						
NP1-1-5																						
NP1-1-6																						
NP1-1-7																						
NP1-1-8																						
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL											1	1	1	1	1	2		1	1	1	2	1
SOLAR TERRESTRIAL																						
NP2-1-1																						
NP2-1-2																						
NP2-1-3																						
NP2-1-4																						
NP2-1-5																						
NP2-2-1																						
NP2-2-2																						
NP2-2-3																						
NP2-2-4																						
SUBTOTAL											1	1				1	2		1	1	2	1
LIFE SCIENCES																						
NP3-1-1																						
NP3-1-2																						
NP3-2-1																						
NP3-2-2																						
NP3-2-3																						
NP3-2-4																						
NP3-3-1																						
SUBTOTAL																						

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996
(000's OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

SPACE PROCESSING-SPACE STATION

NS1-2-1

SUBTOTAL

ORBITAL OPERATIONS

HS3-1-1

NS3-1-2

HS3-1-3

NSJ-1-4

NS3-1-5

N53-1-6

SUBTOTAL

SATELLITE POWER

N54-1-1

N54-1-2

NS4-1-2
NS4-1-3

SUBTOTAL

TOTAL

NASA

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996
(000's OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-HASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1

1 1

SUBTOTAL

1 1

US DOMESTIC COMMUNICATION

CC2-1-1

1

1

CC2-1-2

1

1

CC2-1-4

CC2-1-5

CC2-1-6

1

CC2-1-7

1

CC2-1-8

1

CC2-1-9

1

CC2-1-11

1

CC2-1-12

1

SUBTOTAL

1

1

1

1

3

1

1

1

2

1

FOREIGN COMMUNICATION

CC3-1-1

1

CC3-1-2

CC3-1-4

1

CC3-1-5

1

CC3-1-6

1

CC3-1-10

CC3-1-11

CC3-1-12

CC3-1-13

1

CC3-1-14

CC3-1-16

1

CC3-1-17

1

1

CC3-1-18

CC3-1-20

1

CC3-1-21

1

CC3-1-22

CC3-1-23

1

CC3-1-24

1

CC3-1-26

1

CC3-1-28

1

CC3-1-30

1

CC3-1-32

1

CC3-1-33

1

CC3-1-35

1

CC3-1-36

CC3-1-37

1

CC3-1-38

1

1

1

CC3-1-39

CC3-1-40

1

1

1

SUBTOTAL

5

2

3

3

3

2

2

2

1

3

✓ 111-12

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996
(000'S OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1 1

CO1-1-2 1

CO1-2-1 1

SUBTOTAL 1 1 1

EARTH AND OCEAN MONITORING

CO2-1-1 1 1 2

SUBTOTAL 1 1 2

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1 1 1 1 1 1 1

CO3-2-1 1 1

CO3-2-2 1

CO3-2-3 1 1 1 1 1 1 1

SUBTOTAL 1 1 1 1 1 1 1

WEATHER

CO4-1-2 1 1

CO4-1-3 1 1

CO4-2-2 1 1

SUBTOTAL 1 1 1 1 1

US DOMESTIC

CP1-1-1 1 1 1 1 1 1

SUBTOTAL 1 1 1 1 1 1

FOREIGN

CP2-1-3 1

CP2-1-5 1

CP2-1-6 1

CP2-1-7 1

CP2-1-8 1

CP2-1-14 1

CP2-1-15 1

SUBTOTAL 1 2 1

51117

USERS TOTAL

OUTSIDE 1 4 6 3 2 5 4 8 8 3 7 6 3 3 4 2 4

ALL PROGRAMS

TOTAL 1 7 4 9 7 6 9 11 14 9 13 15 9 7 11 11 54 101

TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

HC1-1-1			2	1						1							1					
HC1-1-2			1			2						1							1			
HC1-1-3					1	1	1					1			1				1			
HC1-1-4								1	1	1	3						1	1				
SUBTOTAL			3	2	3	1	1	2	3	2			1			2	1	2				

GOVERNMENT TO PEOPLE LINKS

HC2-1-1								1					1									
HC2-1-2													1	3	6	5	3					
SUBTOTAL								1				1	1	3	6	5	3					

INTRAGOVERNMENT LINKS

HC4-1-1					1	1	3						1	1			1	1				
HC4-1-2					1	2	3	3	1				1	2	1			1	3			
HC4-2-1			2	1					1										1			
HC4-2-2			1		2								1								1	
SUBTOTAL			3	1	3	2	5	3	3	2	1	3	2	1	1	2	4				1	

PLANETARY

NL1-1-1																						
NL1-1-2						1	1															
NL1-1-3																						
NL1-1-4																						
NL1-1-5								2														
NL1-1-6																						
NL1-1-7																						
NL1-1-8													1									
NL1-1-9																						
NL1-1-10															1							
NL1-1-11																1						
NL1-1-12																	1					
SUBTOTAL						1	3				1	1	1	1	1	1						

LUNAR

NL2-1-1																						
SUBTOTAL																						

EARTH RESOURCES MONITORING

HO1-1-1			1			1					1							1				
HO1-1-2								1	1						1				1			
HO1-1-3								1		1								1				
HO1-1-4													1									
HO1-1-5													1									
HO1-1-6					1																	
HO1-1-7					1					1										1		
HO1-1-8										2										1		
HO1-2-1																						
SUBTOTAL			1	2	1			2	4	2	2			1				2	3			

TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING

NO2-1-1					1	2																
NO2-1-2							1	1	1			1						1				
NO2-1-3					1																	
NO2-1-4											1	1										
NO2-1-5									1									1			1	
NO2-2-1																						
NO2-2-2																						
SUBTOTAL						2	2	1	1	2		1	2					2				1

ASTROPHYSICS

NP1-1-1								2										1				
NP1-1-2						1	2		1	1				1		1						
NP1-1-3									1	2		1			1			1				
NP1-1-4A																						
NP1-1-4B											1						1					
NP1-1-5													1		1							
NP1-1-6								1	1		1											
NP1-1-7																						
NP1-1-8						1																
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL							2	2	3	3	3	2	1	1	2	2	1	1	2			

SOLAR TERRESTRIAL

NP2-1-1								1	1					1					1			
NP2-1-2									1													
NP2-1-3						1	1			1		1	1		1	1		1	1		1	
NP2-1-4											1											
NP2-1-5						1					1	1			1	1		1	1		1	
NP2-2-1														1	2							
NP2-2-2																						
NP2-2-3																						
NP2-2-4																						
SUBTOTAL					2	1	1		2	2	1	1	2		3	4		2	1	2	1	1

LIFE SCIENCES

NP3-1-1							1	1		1		1										
NP3-1-2							1															
NP3-2-1																						
NP3-2-2																						
NP3-2-3																						
NP3-2-4																						
NP3-3-1																						
SUBTOTAL						1	1	1		1		1							2	3		

TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

SPACE PROCESSING-SPACE STATION

HS1-2-1

2 3

SUBTOTAL

2 3

ORBITAL OPERATIONS

HS3-1-1

1 1 3 3 1 2 1 2 1 1 1 2 2 3

HS3-1-2

3 7 2

HS3-1-3

HS3-1-4

HS3-1-5

HS3-1-6

SUBTOTAL

1 4 10 5 1 2 1 2 1 1 1 2 2 3

SATELLITE POWER

HS4-1-1

1 7 4

HS4-1-2

9 19 6

HS4-1-3

SUBTOTAL

1 7 4 9 19 6 8 26 50 99 110 32

TOTAL

NASA

1 6 18 17 11 13 16 17 22 16 16 30 19 8 23 44 66 105 115 34

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1			2		5		2			1		2			1		2		1			
NC1-1-2			1		1		3		3		1		2				1		2		1	
NC1-1-3					1		2		4		3		2		1		3		1		2	
NC1-1-4								1		3		4		5		1		3		1		1
SUBTOTAL			3		7		7		7		5		6		6		4		3		2	

GOVERNMENT TO PEOPLE LINKS

NC2-1-1								1		2		3		1				2		1		2
NC2-1-2																	2	6	10	9	3	
SUBTOTAL								1		2		3		1			4	6	10	10	5	

INTRAGOVERNMENT LINKS

NC4-1-1					1		3		4		5		1		1		3		1			
NC4-1-2								1		5		6		7		3		2		4		2
NC4-2-1			2		5		2						1		2				2		4	
NC4-2-2			1		3		4		5		1				1		3		1		2	
SUBTOTAL			3		8		7		8		6		10		7		8		6		4	

PLANETARY

NL1-1-1																						
NL1-1-2								1		5		6		2				1		3		1
NL1-1-3										1		2		1						1		1
NL1-1-4								1		2		2							1		1	1
NL1-1-5										2		5		1					1		1	1
NL1-1-6																						
NL1-1-7								1		2		3										2
NL1-1-8																						
NL1-1-9														1		2		1				
NL1-1-10																	1	3				
NL1-1-11																	1	2		1		
NL1-1-12																	4	4		2		
SUBTOTAL								2		10		16		8		2	3	4	8	6	4	5

LUHAR

NL2-1-1								3														
SUBTOTAL								3														

EARTH RESOURCES MONITORING

NO1-1-1			3		3				2			2			2				2			2
NO1-1-2								1		3		1		1	1		1		1		1	
NO1-1-3										3		3			1		1		1		1	
NO1-1-4														1	3		1				2	
NO1-1-5														1	3							
NO1-1-6																						
NO1-1-7																						
NO1-1-8																						
NO1-2-1																						
SUBTOTAL			3		9		6		3		7		8		8		9		3		5	

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING

NO2-1-1			1	4	4	1																
NO2-1-2					1	3	2	2		2				1	1	1			2			
NO2-1-3			1	3	1																	
NO2-1-4										1	3	2	2		2	1		2		1	2	
NO2-1-5								2	2													
NO2-2-1																						
NO2-2-2																						
SUBTOTAL			2	7	6	4	4	4	1	5	2	2	1	3	2			2	2	1	2	

ASTROPHYSICS

NP1-1-1					4	8	3	2	3	1								1	3	1		
NP1-1-2			1	6	6	4	3	3	3	1			1	3	1			1	3	1		
NP1-1-3						1	5	5	2	3				1	3	1		1	2	1		
NP1-1-4A								2	3	1					1	1						
NP1-1-4B																						
NP1-1-5								1	2				2	4	1				1	1	1	
NP1-1-6													1		1							
NP1-1-7						2	4				2											
NP1-1-8			1	3	1	1									2	3	1					
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL			1	4	7	13	17	11	11	12	10	4	5	8	8	3	2	6	3	1		

SOLAR TERRESTRIAL

NP2-1-1						1	3	1	1	1	1	1		1	1	1	1	1		
NP2-1-2							3	2												
NP2-1-3						1	1	1	2	2	2	3	2	3	2	2	3	2	3	1
NP2-1-4						1	1	1	2	2	2	3	2	3	2	2	3	2	3	1
NP2-1-5																				
NP2-2-1												2	8	9	2					
NP2-2-2																				
NP2-2-3																				
NP2-2-4																				
SUBTOTAL						2	6	4	4	3	8	5	5	5	5	9	12	16	7	5
FE SCIENCES																				

LIFE SCIENCES

NP3-1-1				1	2	3	3	3	2													
NP3-1-2			1	1	2																	
NP3-2-1																						
NP3-2-2																						
NP3-2-3																						
NP3-2-4																						
NP3-3-1																						
SUBTOTAL			1	2	4	3	3	3	2									1	4	5	2	
																		1	4	5	2	

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA (CONTINUED)																							
SPACE PROCESSING-SPACE STATION																							
NS1-2-1																			1	5	5	2	
SUBTOTAL																			1	5	5	2	
ORBITAL OPERATIONS																							
NS3-1-1				1	4	6	5	4	4	2	4	1			2	3	3	5	5	1			
NS3-1-2																							
NS3-1-3					6	13	5																
NS3-1-4																							
NS3-1-5																							
NS3-1-6																							
SUBTOTAL				1	10	19	10	4	4	2	4	1			2	3	3	5	5	1			
SATELLITE POWER																							
NS4-1-1											2	12	10										
NS4-1-2														17	40	15							
NS4-1-3																		19	57	101	181	193	56
SUBTOTAL											2	12	10	17	40	15		19	57	101	181	193	56
TOTAL																							
NASA				3	23	53	54	48	51	54	63	68	50	52	76	69	41	57	102	142	215	210	60

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1		1	5	8	2																	
SUBTOTAL		1	5	8	2																	
US DOMESTIC COMMUNICATION																						
CC2-1-1			3	4	4	2		1	1		1	2	1	1	1			1	2	1		
CC2-1-2		3	5	2																		
CC2-1-4	2	4				1	1															
CC2-1-5		1	3	2																		
CC2-1-6					1	4	3	1														
CC2-1-7										2	6	3		2	3				1	1		
CC2-1-8										2	5	3						1	3	2	1	
CC2-1-9										2	7	3										
CC2-1-11										1	4	5	1					1	2			
CC2-1-12																						
SUBTOTAL	2	8	11	8	5	7	4	2	4	15	20	10	6	9	7	1	2	7	9	4	1	
FOREIGN COMMUNICATION																						
CC3-1-1				2	4	3	1															
CC3-1-2																						
CC3-1-4				2	4	3	1				2	5	2	1					2	2	1	
CC3-1-5								2	4	3	1											
CC3-1-6	1	4	2												2	2						
CC3-1-10		1	2																			
CC3-1-11	1	2	1																			
CC3-1-12		1	4	1																		
CC3-1-13			2	4	3	1																
CC3-1-14																						
CC3-1-16											2	5	2	1					2	2	1	
CC3-1-17				2	6	3	1								1	2	1	1				
CC3-1-18																						
CC3-1-20								2	4		2	6	4					1	4	4	1	
CC3-1-21				2	4	3										1	1					
CC3-1-22																						
CC3-1-23							2	5	3			2	4	3	1					1	1	
CC3-1-24																						
CC3-1-26						2	8	4								2	5	3				
CC3-1-28			1	2	1									1	4	3						
CC3-1-30		2	4	2																		
CC3-1-32						3	6	1			1	2	1	1	2							
CC3-1-33		1	4	2													1	2				
CC3-1-35						2	6	3	2	1	1											
CC3-1-36							1	4	2	1	1	1										
CC3-1-37																						
CC3-1-38			2	4	3	1					1	1	2			2	6	4	3	2	2	1
CC3-1-39										2	5	2	2	1					3	2	2	1
CC3-1-40																						
SUBTOTAL	2	11	28	33	33	36	27	18	8	13	26	17	11	15	17	11	9	13	14	6		

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

C01-1-1 3 3 2 2

C01-1-2 2 7 3

C01-2-1 1 4 5 2

SUBTOTAL 2 7 3 1 4 5 2 3 3 1 2 1 2

EARTH AND OCEAN MONITORING

C02-1-1 1 6 9 4 1 2 6 4 1

SUBTOTAL 1 6 9 4 1 2 6 4 1

EARTH RESOURCES-US DOMESTIC AND FOREIGN

C03-1-1 1 5 3 1 3 3 4 3 4 5 6 4 1

C03-2-1 2 4 1 1 1 2 4 1 1 1 1

C03-2-2 1 3

C03-2-3 4 12 3 2 4 4 6 7 5 6 7 5 1

SUBTOTAL 4 12 3 2 4 4 6 7 5 6 7 5 1

WEATHER

C04-1-2 1 4 2 2 2 2 1 2 1 1

C04-1-3 1 2 3 2 2 2 2 2 2 2

C04-2-2 2 4 2 2 1 1 1 2

SUBTOTAL 1 4 2 2 4 6 3 3 3 6 2 2 3 3 3 2 2 2

US DOMESTIC

CP1-1-1 3 7 6 4 3 4 4 4 4 2 1

SUBTOTAL 3 7 6 4 3 4 4 4 4 2 1

FOREIGN

CP2-1-3 1 3 1

CP2-1-5 2 6 2 1 2

CP2-1-6 3 5 2 1 2 1 1

CP2-1-7 1 2 2 1 1 1 1 2 1

CP2-1-8 1 2 3 1 1 1 1 1 1

CP2-1-14 1 3 1 1 1 1 1 2

CP2-1-15 3 1

SUBTOTAL 2 10 14 8 3 7 4 3 3 2 2 5 4 1 3 2 3

USERS TOTAL

OUTSIDE 3 15 33 63 61 58 59 49 43 44 46 53 48 47 47 34 29 28 29 22 7

ALL PROGRAMS

TOTAL 3 18 56 116 115 106 110 103 106 112 96 105 124 116 88 91 131 170 244 232 67

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA MISSIONS																							
INTERGOVERNMENT LINKS																							
NC1-1-1			6	66	141	51			6	25	49	17			6	24	49	18					
NC1-1-2				18	58	93	94	35			6	31	63	22			6	31	63	22			
NC1-1-3					23	74	114	111			39	6	34	70			24	6	34	69	24		
NC1-1-4									28	88	137	132	49				6	40	82	29			
SUBTOTAL			6	84	222	218	208	180	152	192	186	146	98	54	95	137	126	91	24				
GOVERNMENT TO PEOPLE LINKS																							
NC2-1-1									17	52	54	16	6	12	22	7	6	11	22	7			
NC2-1-2															38	120	195	199	73				
SUBTOTAL									17	52	54	16	6	12	60	127	201	210	95	7			
INTRAGOVERNMENT LINKS																							
NC4-1-1					28	88	137	132	49	6	40	82	29	6	40	83	29						
NC4-1-2							33	107	166	164	59	6	49	102	36	6	49	103	36				
NC4-2-1			6	67	142	51				6	25	50	17			6	25	50	18				
NC4-2-2				28	88	137	132	49			6	40	82	29				6	40	83	29		
SUBTOTAL			6	95	230	216	220	219	239	221	195	155	145	160	137	82	114	134	161	119	29		
PLANETARY																							
NL1-1-1										9	51	57	16			19	31	9					
NL1-1-2								10	54	62	17						20	32	10				
NL1-1-3									1	26	50	15						1	15	21	6		
NL1-1-4					6	23	41	24	5								6	15	23	18	5		
NL1-1-5							12	38	73	24							6	12	21	6			
NL1-1-6										16	77	87	25										
NL1-1-7								10	54	61	18								19	33	9		
NL1-1-8									7	32	63	22											
NL1-1-9										7	24	46	16										
NL1-1-10												7	29	57	19								
NL1-1-11															20	34	10						
NL1-1-12													17	51	97	99	34						
SUBTOTAL							6	45	144	255	247	193	185	183	199	171	107	69	88	78	20		
LUNAR																							
NL2-1-1				25	41	14																	
SUBTOTAL				25	41	14																	
EARTH RESOURCES MONITORING																							
NO1-1-1			11	48	52	16	10		22	7	11	20	8	10	21	8	10	21	7	10	22	7	
NO1-1-2									21	44	22	13	11	12	11	13	11	12	11	13	5		
NO1-1-3									17	52	57	23	15	26	15	13	26	15	14	27	8		
NO1-1-4												18	39	14									
NO1-1-5										6	12	24	8										
NO1-1-6				17	57	62	19																
NO1-1-7				17	58	63	20			6	17	30	10	6	16	30	10	6	17	30	10		
NO1-1-8									6	18	34	11	6	9	14	4	6	9	14	4			
NO1-2-1					9	22	14	10	9	10	9	10	9	9	9	9	10	9	10	9	7	1	
SUBTOTAL			11	82	176	163	63	76	136	157	136	123	94	86	77	73	72	73	93	52	8		

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING

NO2-1-1	14	62	70	23																	
NO2-1-2			9	41	44	14	9	18	7		9	17	7		9	18	7				
NO2-1-3	25	54	20																		
NO2-1-4								16	47	52	22	13	24	14	13	24	14	14	24	8	
NO2-1-5			6	8	26	17															
NO2-2-1			1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	1	
NO2-2-2			1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	1	
SUBTOTAL	39	116	107	74	72	35	27	69	61	26	24	45	23	17	35	36	23	26	8		

ASTROPHYSICS

NP1-1-1				35	74	27		14	26	9							13	26	9		
NP1-1-2		10	45	48	25	21	17	20	7		10	21	7								
NP1-1-3					10	45	47	25	20	7		10	19	7		9	21	7			
NP1-1-4A						6	17	31	10			6	9	13		4					
NP1-1-4B									6	15	29	9				6	8	11	4		
NP1-1-5								15	32	17	10	9	9	3							
NP1-1-6				23	49	17		7	16	5											
NP1-1-7													29	61	22						
NP1-1-8	1	8	17	8	5	2															
NP1-2-1				2	4	4	5	4	5	4	5	4	5	4	5	4	5	4	3		
NP1-2-2				1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2		
NP1-2-3				1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1		
NP1-2-4								1	2												
SUBTOTAL	1	8	27	57	119	168	126	104	140	112	56	56	94	107	52	40	65	35	10		

SOLAR TERRESTRIAL

NP2-1-1				15	29	15	9	7	8	8	9	7	8	8	9	7	8	3			
NP2-1-2				3	18	14															
NP2-1-3	12	23	21	16	15	10	12	14	17	20	18	19	19	19	18	19	19	17	11	3	
NP2-1-4	18	44	40	36	24	10	7	8	12	12	13	12	13	12	13	12	13	12	9	2	
NP2-1-5											13	63	68	21							
NP2-2-1							1	1	1	2	1	2	1	2	1	2	1	1			
NP2-2-2							1	3	3	3	3	3	3	3	3	3	3	2			
NP2-2-3							2	4	4	5	4	5	4	5	4	5	4	3			
NP2-2-4				4	11	17	18	18	18	18	18	18	18	18	18	18	18	18	11	2	
SUBTOTAL	30	67	61	52	61	78	69	57	62	68	78	131	133	88	65	68	65	61	34	7	

LIFE SCIENCES

NP3-1-1			16	76	99	95	99	61	12												
NP3-1-2	14	41	80	92	34																
NP3-2-1			1	3	3	3	3	2													
NP3-2-2			1	1	1	2	1	1													
NP3-2-3			1	1	1	2	1	1													
NP3-2-4		1																			
NP3-3-1																		24	113	127	40
SUBTOTAL	14	42	99	173	138	102	104	65	12									24	113	127	40

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA (CONTINUED)																							
SPACE PROCESSING-SPACE STATION																							
NS1-2-1																			24	113	127	40	
SUBTOTAL																			24	113	127	40	
ORBITAL OPERATIONS																							
NS3-1-1	20	60	94	84	55	48	40	48	16			25	48	40	73	64	16						
NS3-1-2			1	2		1	2		1	2													
NS3-1-3		40	84	30																			
NS3-1-4				1		1	1	1								1	1	1			1	1	
NS3-1-5				3	4																		
NS3-1-6				3	4							3	4	1					3	4			
SUBTOTAL	20	100	179	123	63	50	43	49	17	5	4	26	48	41	74	68	20	1	1				
SATELLITE POWER																							
NS4-1-1									3	19	15												
NS4-1-2														19	42	15							
NS4-1-3																		19	57	105	195	205	58
SUBTOTAL									3	19	15	19	42	15				19	57	105	195	205	58
TOTAL																							
NASA	71	393	919	1140	1062	1005	1033	1121	1164	947	788	826	871	811	859	903	936	876	544	121			

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1 16 81 115 77

SUBTOTAL 16 81 115 77

US DOMESTIC COMMUNICATION

CC2-1-1 11 49 74 58 25 7 7 16 8 15 32 12 8 15 5 3 17 31 11

CC2-1-2 25 51 32

CC2-1-4 17 34 14 1 5 12 5

CC2-1-5 20 39 15

CC2-1-6 1 21 49 37 8 2 20 43 24 28 8 1 6 12 4

CC2-1-7 2 20 43 24 2 3 11 24 15 3

CC2-1-8 1 20 43 26 4

CC2-1-9 2 22 51 27 3

CC2-1-11 15 46 51 16

CC2-1-12 19 73 99 83 20 6 24 9 72 20

SUBTOTAL 17 90 153 122 80 79 56 22 56 145 181 128 115 135 106 34 34 94 124 98 24

FOREIGN COMMUNICATION

CC3-1-1 1 17 38 23 4

CC3-1-2 1 18 42 23 5 1 7 18 15 4

CC3-1-4 1 17 37 22 4

CC3-1-5 1 17 37 21 4 1 7 16 14 3

CC3-1-6 17 33 12

CC3-1-10 1 17 33 13

CC3-1-11 10 18 7

CC3-1-12 1 14 26 10

CC3-1-13 1 17 37 22 4

CC3-1-14 1 18 41 23 4 1 7 18 15 3

CC3-1-16 1 25 59 34 6 1 10 24 21 5

CC3-1-17 2 22 46 26 3

CC3-1-18 2 25 52 30 3 3 13 35 30 8

CC3-1-20 1 16 30 11 1 5 10 4

CC3-1-21 1 17 36 22 4

CC3-1-22 1 17 39 22 4 1 5 11 3

CC3-1-23 1 20 43 26 4

CC3-1-24 1 20 45 26 5

CC3-1-26 2 34 76 42 6 3 17 41 27 6

CC3-1-28 1 8 15 6

CC3-1-30 31 52 19 1 7 12 5 6 13 5

CC3-1-32 1 19 37 15 1 6 13 4 1 6 13 4

CC3-1-33 1 15 30 11

CC3-1-35 1 27 62 37 14 17 6

CC3-1-36 1 18 40 24 9 10 3

CC3-1-37 1 26 62 45 31 29 23 5

CC3-1-38 1 17 38 22 4 1 5 13 9 11 3

CC3-1-39 1 27 64 46 22 5 2 10 26 31 22 7

CC3-1-40 1 19 36 13 1 6 12 5 1 5 12 4 2 6 13 3

SUBTOTAL 30 135 200 312 295 308 284 187 121 156 219 159 99 130 173 135 109 149 119 30

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1												10	45	51	26	22	18	22	8		
CO1-1-2				32	71	41	7														
CO1-2-1								13	60	66	21				14	30	10				
SUBTOTAL				32	71	41	7	13	60	66	21	10	45	51	40	52	28	22	8		

EARTH AND OCEAN MONITORING

CO2-1-1													16	94	137	75	12	34	89	61	13
SUBTOTAL													16	94	137	75	12	34	89	61	13

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1								23	54	36	23	30	42	45	46	52	63	67	49	13	
CO3-2-1								25	54	19	9	18	6								
CO3-2-2														26	53	19	9	18	6		
CO3-2-3								12	26	8											
SUBTOTAL								60	134	63	32	48	48	71	99	71	72	85	55	13	

WEATHER

CO4-1-2	25	61	47	34	33	33	34	33	26	10											
CO4-1-3								10	44	54	38	30	30	30	31	30	22	6			
CO4-2-2				1	22	43	17	1	7	14	6	1	7	14	5	2	7	15	5		
SUBTOTAL	25	61	47	35	55	76	51	44	77	78	44	31	37	44	36	32	29	21	5		

US DOMESTIC

CP1-1-1								19	43	31	20	21	20	21	20	21	15	3			
SUBTOTAL								19	43	31	20	21	20	21	20	21	15	3			

FOREIGN

CP2-1-3	17	34	13																		
CP2-1-5		16	32	12				4	9	2				4	8	4					
CP2-1-6					15	31	11	5	10	3	5	9	3	4	10	4					
CP2-1-7	6	14	36	17	17	12	18	10	18	12	18	11	18	11	18	11	12	3			
CP2-1-8	6	22	40	29	12	14	3		6	14	21	17	3	7	15	22	17	3			
CP2-1-14	13	25	10																		
CP2-1-15		5	17	12																	
SUBTOTAL	42	116	148	70	44	57	36	24	36	29	44	41	32	26	43	37	29	6			

USERS TOTAL

OUTSIDE	42	197	490	719	713	587	606	549	499	468	495	560	619	588	523	411	367	374	368	236	54
---------	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----

ALL PROGRAMS

TOTAL	42	274	1017	2025	2433	2296	2270	2292	2377	2358	2068	1961	2106	2189	2110	1980	1963	2029	1907	1384	343
-------	----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1

2

2

2

NC1-1-2

2

2

2

NC1-1-3

3

4

3

NC1-1-4

5

5

5

SUBTOTAL

2

2

3

2

5

2

4

2

5

2

3

GOVERNMENT TO PEOPLE LINKS

NC2-1-1

1

1

1

NC2-1-2

50

SUBTOTAL

1

1

50

1

PEOPLE TO PEOPLE LINKS

NC3-1-1

10

10

10

10

NC3-1-2

25

25

NC3-1-3

100

100

SUBTOTAL

10

10

25

110

25

10

100

INTRAGOVERNMENT LINKS

NC4-1-1

5

5

5

NC4-1-2

15

15

15

NC4-2-1

2

2

2

NC4-2-2

5

5

5

SUBTOTAL

2

5

5

15

2

5

5

15

5

2

15

5

ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1

10

10

10

10

10

NC5-1-2

40

40

40

40

40

SUBTOTAL

10

10

40

10

40

10

50

PLANETARY

NL1-1-1

1

2

NL1-1-2

1

NL1-1-3

1

NL1-1-4

2

NL1-1-5

1

NL1-1-6

1

1

NL1-1-7

1

NL1-1-8

1

NL1-1-9

1

NL1-1-10

1

NL1-1-11

1

NL1-1-12

2

SUBTOTAL

4

2

1

1

3

2

1

1

LUNAR

NL2-1-1

1

SUBTOTAL

1

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1						1			2				1			1			2			1	
NO1-1-2											1		1			1			1			1	
NO1-1-3												1				1			1			1	
NO1-1-4												1				1					2		
NO1-1-5																							
NO1-1-6																							
NO1-1-7								1															
NO1-1-8								1					1			1					1		
NO1-2-1																							
SUBTOTAL								1	2		2	1	2	3		2	2	3	1	3	1	4	1

ENVIRONMENTAL MONITORING

NO2-1-1							3															
NO2-1-2									2			2				1				2		
NO2-1-3						1																
NO2-1-4													1			2			1			2
NO2-1-5																						
NO2-2-1																						
NO2-2-2																						
SUBTOTAL						1	3		2			2	1		3				1	2		2

ASTROPHYSICS

NP1-1-1																						
NP1-1-2									2					1						2		
NP1-1-3							3			2			3			3						
NP1-1-4A											3		2				3			3		
NP1-1-4B																						
NP1-1-5												1				1					1	
NP1-1-6														1								
NP1-1-7													1									
NP1-1-8																	1					
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL							3	2	2	3	4	4				4	4			5	1	

SOLAR TERRESTRIAL

NP2-1-1																						
NP2-1-2									1		1		1		1		1			1		
NP2-1-3																						
NP2-1-4						1				1		1		1		1	1		1		1	1
NP2-1-5							1				1		1			1		1		1		
NP2-2-1																						
NP2-2-2																						
NP2-2-3																						
NP2-2-4																						
SUBTOTAL						1	1		1	1	2	1	1	2	1	5	2	1	2	1	2	1

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1 1 1 2 2

NP3-1-2 1

NP3-2-1

NP3-2-2

NP3-2-3

NP3-2-4

NP3-3-1 5

SUBTOTAL 1 1 1 2 2 5

SPACE PROCESSING-SPACE STATION

NS1-2-1 6

SUBTOTAL 6

SPACE INDUSTRIALIZATION

NS2-1-1 25

NS2-1-2

NS2-1-3 60

NS2-1-4

NS2-1-5

SUBTOTAL 25 60

ORBITAL OPERATIONS

NS3-1-1 10 10 10 10 10 10

NS3-1-2

NS3-1-3 25

NS3-1-4

NS3-1-5

NS3-1-6

SUBTOTAL 25 10 10 10 10 10

SATELLITE POWER

HS4-1-1 25

HS4-1-2 250

HS4-1-3 2000

HS4-1-4 30000 30000 15000 30000 45000

SUBTOTAL 25 250 2000 30000 30000 15000 30000 45000

TOTAL

NASA 30 18 46 28 15 297 34 36 2010 137 51 1643003830097150293007345104

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1
CC1-1-2
CC1-1-3

1 5 4 5 4 3 4 4 3 2 2 4

SUBTOTAL

1 5 4 5 4 3 4 4 3 2 2 4

US DOMESTIC COMMUNICATION

CC2-1-1
CC2-1-2

2 2 1 1 2 1 2

CC2-1-3

4 2 2 3 2 2

CC2-1-4

1

CC2-1-5

1

CC2-1-6

1 2 1 2 1 2

CC2-1-7

1

CC2-1-8

1

CC2-1-9

1

CC2-1-10

4 2 2 3 4 2

CC2-1-11

1

CC2-1-12

2 4 1 2 3

CC2-1-13

1

CC2-1-14

1 1 3 4 5 2 5 6 6

SUBTOTAL

2 2 2 2 7 2 5 4 6 3 3 4 8 5 2 5 6 6

FOREIGN COMMUNICATION

CC3-1-1

1

CC3-1-2

1

CC3-1-4

1

CC3-1-5

1

CC3-1-6

1

CC3-1-7

1

CC3-1-8

2

CC3-1-9

2

CC3-1-10

1

CC3-1-11

2

CC3-1-12

1

CC3-1-13

1

CC3-1-14

1

CC3-1-16

1 1 1 2 1 1

CC3-1-17

1

CC3-1-18

1 1

CC3-1-20

1 1

CC3-1-21

1

CC3-1-22

1

CC3-1-23

1

CC3-1-24

1

CC3-1-26

1

CC3-1-28

1

CC3-1-30

1

CC3-1-32

1

CC3-1-33

1

CC3-1-35

1 1

VIII-30

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS.(CONTINUED)

FOREIGN COMMUNICATION (CONT.)

CC3-1-36											1							1		1	1		
CC3-1-37																							
CC3-1-38								1							1								
CC3-1-39												1	2	1					2	1	1		
CC3-1-40									1								1						
SUBTOTAL						2	1	1	6	6	3	4	2	3	3	4	2	5	5	5	3	4	4

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1															1		1		2		
CO1-1-2							1														
CO1-1-3										1		1			1			1	1		
CO1-2-1											4						3				
SUBTOTAL						1				1	4	1			2		4	1	3		

EARTH AND OCEAN MONITORING

CO2-1-1																8	4	4	9	16	16	17
SUBTOTAL																8	4	4	9	16	16	17

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1								2	1	2	1	4	3	3	3	5	5	5			
CO3-1-2										2			1		2		1				
CO3-1-3															1		1				
CO3-1-4																1		1			
CO3-2-1								2			1										
CO3-2-2														2			1				
CO3-2-3								1													
CO3-2-4										1		2		1		2		1			
CO3-2-5																1	1				
CO3-2-6																			1		
SUBTOTAL								5	1	5	2	6	4	6	6	9	9	8			

WEATHER

CO4-1-2				1	1	2	1	1	1	1	2										
CO4-1-3												2	1	2	1	2	1	2	1		
CO4-2-2												1								1	
CO4-2-4												1							1		
CO4-2-5							1		1						1				1		
SUBTOTAL				1	1	2	2	2	1	2	2	4	1	2	1	3	1	2	3	1	

US DOMESTIC

CP1-1-1											4	4	4	5	4	4	4	4	4	5	4	4
SUBTOTAL											4	4	4	5	4	4	4	4	4	5	4	4

FOREIGN

CP2-1-3																					
CP2-1-5							1				1						1				
CP2-1-6									1				1						1		
CP2-1-7										1					1						
CP2-1-8																1					
CP2-1-14																					
CP2-1-15																					
CP2-1-16								1	1	1	1		1	1	1	1	1	1		1	
SUBTOTAL							1	1	1	2	1	1	2	1	2	3	2	1	2		1

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
OTHER USERS (CONTINUED)																							
DISASTER WARNING																							
CS1-1-1													4	4					5	4			
SUBTOTAL													4	4					5	4			
TRAFFIC MANAGEMENT																							
CS2-1-1														1	1								
CS2-1-2																	1	1					
CS2-1-3													1	1							1		
SUBTOTAL													1	1	1	1		1	1	1			
SPACE MANUFACTURING-US DOMESTIC AND FOREIGN																							
CS3-1-1																							
CS3-1-2																							
CS3-1-3																							
CS3-1-4																							
CS3-2-1																							
CS3-2-2																							
CS3-2-3																							
CS3-2-4																							
CS3-2-5																							
SUBTOTAL																							
USERS TOTAL																							
OUTSIDE					1	6	11	10	11	25	15	28	19	31	27	26	32	38	39	45	30	31	31
ALL PROGRAMS																							
TOTAL					1	6	53	41	68	87	57	407	151	137	2288	289	209	6333	30219	30267	15616	30210	45750

V111-32

TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1	1						1									1						
NC1-1-2						1								1					1			
NC1-1-3										2						2				2		
NC1-1-4													3					3				
SUBTOTAL	1					1				2		1	3	1	2		1	3	1	2		

GOVERNMENT TO PEOPLE LINKS

NC2-1-1												1									1	
NC2-1-2																			14			
SUBTOTAL												1							14		1	

PEOPLE TO PEOPLE LINKS

NC3-1-1							5						6				5				6	
NC3-1-2															8				8			
NC3-1-3																						
SUBTOTAL							5						6		8		29		8		6	23

INTRAGOVERNMENT LINKS

NC4-1-1										3				3					2			
NC4-1-2												7				7				7		
NC4-2-1						1							1						1			
NC4-2-2								3							3						2	
SUBTOTAL						1		3		3		7	1	3	3	7		2	1	7	2	

ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1								5					6			5		6			5	
NC5-1-2															11		11				11	
SUBTOTAL								5					6		11	5	11	6			16	

PLANETARY

NL1-1-1																						
NL1-1-2												1							1			
NL1-1-3																					1	
NL1-1-4																						
NL1-1-5												1								1		
NL1-1-6																						
NL1-1-7													1									
NL1-1-8																						
NL1-1-9																						
NL1-1-10																						
NL1-1-11																						
NL1-1-12																	1					
SUBTOTAL											3	1					1		1	1	1	

LUNAR

NL2-1-1																						
SUBTOTAL																						

V11-3-3

TOTAL SOL ARRAY LBS BY FISCAL YEAR THPOUGH 1996
(HUNDREDS OF LBS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
NASA (CONTINUED)																								
EARTH RESOURCES MONITORING																								
NO1-1-1								1						1			1			1				
NO1-1-2													1				1		1		1			
NO1-1-3													1							1				
NO1-1-4																								
NO1-1-5																								
NO1-1-6																								
NO1-1-7																			1					
NO1-1-8														1								1		
NO1-2-1																								
SUBTOTAL								1	2				1	2	1		1	1	2	1	2	1		
ENVIRONMENTAL MONITORING																								
NO2-1-1								2																
NO2-1-2										1				1				1				1		
NO2-1-3								1																
NO2-1-4														1				1					1	
NO2-1-5																								
NO2-2-1																								
NO2-2-2																								
SUBTOTAL								1	2				1	1				2				1		1
ASTROPHYSICS																								
NP1-1-1																						1		
NP1-1-2									2			1		2				1						
NP1-1-3													2		1				2			1		
NP1-1-4A																				1				
NP1-1-4B																								
NP1-1-5																1								
NP1-1-6																								
NP1-1-7																				1				
NP1-1-8																								
NP1-2-1																								
NP1-2-2																								
NP1-2-3																								
NP1-2-4																								
SUBTOTAL										2	2	1	2	2	2	1	1	1	3	1		2		
SOLAR TERRESTRIAL																								
NP2-1-1																						1		
NP2-1-2																								
NP2-1-3																								
NP2-1-4																								
NP2-1-5																								
NP2-2-1																								
NP2-2-2																								
NP2-2-3																								
NP2-2-4																								
SUBTOTAL																								

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TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1

NP3-1-2

NP3-2-1

NP3-2-2

NP3-2-3

NP3-2-4

NP3-3-1

SUBTOTAL

SPACE PROCESSING-SPACE STATION

NS1-2-1

SUBTOTAL

SPACE INDUSTRIALIZATION

NS2-1-1

NS2-1-2

NS2-1-3

NS2-1-4

NS2-1-5

SUBTOTAL

ORBITAL OPERATIONS

NS3-1-1

NS3-1-2

NS3-1-3

NS3-1-4

NS3-1-5

NS3-1-6

SUBTOTAL

SATELLITE POWER

NS4-1-1

NS4-1-2

NS4-1-3

NS4-1-4

SUBTOTAL

TOTAL

NASA

1 11 11 21 17 8 52 20 22 229 43 26 50 2162 2175 1086 2168 3236

VIII-35

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1

5

6

5

NC1-1-2

5

6

5

NC1-1-3

7

7

7

NC1-1-4

8

8

8

SUBTOTAL

5

5

7

6

8

6

7

5

8

5

7

GOVERNMENT TO PEOPLE LINKS

NC2-1-1

5

5

5

NC2-1-2

22

SUBTOTAL

5

5

22

5

PEOPLE TO PEOPLE LINKS

NC3-1-1

11

11

11

11

NC3-1-2

16

16

NC3-1-3

30

30

SUBTOTAL

11

11

16

41

16

11

30

INTRAGOVERNMENT LINKS

NC4-1-1

8

8

8

NC4-1-2

13

13

13

NC4-2-1

5

6

5

NC4-2-2

8

8

8

8

SUBTOTAL

5

8

8

13

6

8

8

13

8

5

13

8

ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1

11

11

11

11

11

NC5-1-2

20

20

20

SUBTOTAL

11

11

20

11

20

11

31

PLANETARY

NL1-1-1

NL1-1-2

9

9

NL1-1-3

2

2

NL1-1-4

2

1

2

2

NL1-1-5

7

3

NL1-1-6

4

3

NL1-1-7

NL1-1-8

NL1-1-9

3

NL1-1-10

3

NL1-1-11

2

NL1-1-12

8

SUBTOTAL

2

17

6

3

3

10

9

5

7

LUNAR

NL2-1-1

SUBTOTAL

95-111A
25-36

TOTAL ELECT PWR LBS BY FISCAL YEA

ROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1						3			2				3			2			3			3
NO1-1-2									2				2			3		2		2		
NO1-1-3												4			3			4		3		
NO1-1-4														2								
NO1-1-5														1								
NO1-1-6								4														
NO1-1-7								4					4				4			4		
NO1-1-8												2				2			2			
NO1-2-1																						
SUBTOTAL							3	8		2	2	6	9	3	6	4	6	4	5	2	9	3

ENVIRONMENTAL MONITORING

NO2-1-1						6															
NO2-1-2								3				4				3			4		
NO2-1-3						2															
NO2-1-4													5			4			5		4
NO2-1-5								2													
NO2-2-1																					
NO2-2-2																					
SUBTOTAL						2	6		5			4	5			7			5	4	4

ASTROPHYSICS

NP1-1-1								11					11						11		
NP1-1-2							11		10		11				10						
NP1-1-3										11			10			11			10		
NP1-1-4A											3						2				
NP1-1-4B														3						2	
NP1-1-5											1		2			1					
NP1-1-6								2					2								
NP1-1-7																	4				
NP1-1-8						1		1													
NP1-2-1																					
NP1-2-2																					
NP1-2-3																					
NP1-2-4																					
SUBTOTAL						1		12	13	10	11	15	23	2	3	11	15	2		21	2

SOLAR TERRESTRIAL

HP2-1-1								2		3			2		2		3		2				
NP2-1-2								2															
NP2-1-3						2	1	2	1	2	2	1	3	4	3	3	3	4	3	3	3		
NP2-1-4						2	2	1	2	2	2	2	3	4	3	4	3	4	3	4	3		
NP2-1-5																							
NP2-2-1																17							
NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL						4	3	3	3	8	4	6	6	10	6	9	24	8	8	9	7	9	6

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1

NP3-1-2

NP3-2-1

NP3-2-2

NP3-2-3

NP3-2-4

NP3-3-1

SUBTOTAL

SPACE PROCESSING-SPACE STATION

NS1-2-1

SUBTOTAL

SPACE INDUSTRIALIZATION

NS2-1-1

NS2-1-2

NS2-1-3

NS2-1-4

NS2-1-5

SUBTOTAL

ORBITAL OPERATIONS

NS3-1-1

NS3-1-2

NS3-1-3

NS3-1-4

NS3-1-5

NS3-1-6

SUBTOTAL

SATELLITE POWER

NS4-1-1

NS4-1-2

NS4-1-3

NS4-1-4

SUBTOTAL

TOTAL

NASA

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA (CONTINUED)																							
LIFE SCIENCES																							
NP3-1-1									3	3	6	3											
NP3-1-2							3																
NP3-2-1																							
NP3-2-2																							
NP3-2-3																							
NP3-2-4																							
NP3-3-1													9										
SUBTOTAL								3	3	3	6	3	9										
SPACE PROCESSING-SPACE STATION																							
NS1-2-1																		9					
SUBTOTAL																		9					
SPACE INDUSTRIALIZATION																							
NS2-1-1												16											
NS2-1-2																							
NS2-1-3																24							
NS2-1-4																							
NS2-1-5																							
SUBTOTAL											16				24								
ORBITAL OPERATIONS																							
NS3-1-1								11		11		11					11		11	11			
NS3-1-2																							
NS3-1-3							16																
NS3-1-4																							
NS3-1-5																							
NS3-1-6																							
SUBTOTAL						16	11		11		11					11		11	11				
SATELLITE POWER																							
NS4-1-1									16														
NS4-1-2											62												
NS4-1-3															463								
NS4-1-4																							
SUBTOTAL								16			62				463			4280	4280	2140	4280	6420	
TOTAL																		4280	4280	2140	4280	6420	
NASA	4	29	31	61	56	39	128	70	83	491	93	89	105	4341	4367	2204	4357	6463					

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1	6	17																				
CC1-1-2			17		17	17	12															
CC1-1-3									14	14	13	7				7	14					
SUBTOTAL	6	17	17		17	17	12		14	14	13	7				7	14					

US DOMESTIC COMMUNICATION

CC2-1-1			7	7	4		4		7							3				8		
CC2-1-2		5																				
CC2-1-3						14	7						7						13	7	7	
CC2-1-4	2					3																
CC2-1-5		3																				
CC2-1-6					3	7									3	7					3	
CC2-1-7									5	2									5	2		
CC2-1-8									3	3												
CC2-1-9										6	2											
CC2-1-10								14	7	7						13	14	7				
CC2-1-11										5												
CC2-1-12																7	14			7	13	
CC2-1-13											3											
CC2-1-14							3		5			2	10	5		3						
SUBTOTAL	2	8	7	7	7	24	10	18	18	25	14	10	19	30	17	7	23	24	23			

FOREIGN COMMUNICATION

CC3-1-1				3	2																
CC3-1-2													3	3						2	3
CC3-1-4				3	2																
CC3-1-5						3	2									3	2				
CC3-1-6		2																			
CC3-1-7				3	2			3	2								3	3			
CC3-1-8		5																			
CC3-1-9						5				5						6				5	
CC3-1-10			2																		
CC3-1-11		1																			
CC3-1-12			2																		
CC3-1-13				3	2																
CC3-1-14											3	2							3	3	
CC3-1-16						3	4										3	4			
CC3-1-17				5	2																
CC3-1-18											6	3							6	6	
CC3-1-20								2										3			
CC3-1-21					2	3										3	2				3
CC3-1-22																					
CC3-1-23							3	3													
CC3-1-24																		3	4		
CC3-1-26						7	3									7	4				
CC3-1-28						1															
CC3-1-30													3				3				
CC3-1-32							4						4						4		
CC3-1-33						3															
CC3-1-35							3	4		3											

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

FOREIGN COMMUNICATION (CONT.)

CC3-1-36

CC3-1-37

CC3-1-38

CC3-1-39

CC3-1-40

SUBTOTAL

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1

CO1-1-2

CO1-1-3

CO1-2-1

SUBTOTAL

EARTH AND OCEAN MONITORING

CO2-1-1

SUBTOTAL

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1

CO3-1-2

CO3-1-3

CO3-1-4

CO3-2-1

CO3-2-2

CO3-2-3

CO3-2-4

CO3-2-5

CO3-2-6

SUBTOTAL

WEATHER

CO4-1-2

CO4-1-3

CO4-2-2

CO4-2-4

CO4-2-5

SUBTOTAL

US DOMESTIC

CP1-1-1

SUBTOTAL

FOREIGN

CP2-1-3

CP2-1-5

CP2-1-6

CP2-1-7

CP2-1-8

CP2-1-14

CP2-1-15

CP2-1-16

SUBTOTAL

VIII-46

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

DISASTER WARNING

CS1-1-1

12 12

13 12

SUBTOTAL

12 12

13 12

TRAFFIC MANAGEMENT

CS2-1-1

6 3

CS2-1-2

7 3

CS2-1-3

3 2

3 2

SUBTOTAL

3 2 6 3

7 6 2

SPACE MANUFACTURING-US DOMESTIC AND FOREIGN

CS3-1-1

CS3-1-2

CS3-1-3

CS3-1-4

CS3-2-1

CS3-2-2

CS3-2-3

CS3-2-4

CS3-2-5

SUBTOTAL

USERS TOTAL

OUTSIDE

4 25 46 60 36 81 60 80 56 96 93 72 91 111 104 116 74 90 83

ALL PROGRAMS

TOTAL

4 29 75 91 97 137 99 208 126 179 584 165 180 216 4445 4483 2278 4447 6546

✓
14-1118

TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA MISSIONS																							
INTERGOVERNMENT LINKS																							
NC1-1-1							2	1				1						1					
NC1-1-2							1		2					1						1			
NC1-1-3								1	1	1				1						1			
NC1-1-4											1	1	3					1	1				
SUBTOTAL							3	2	3	1	1	2	3	2		1		2	1	2			
GOVERNMENT TO PEOPLE LINKS																							
NC2-1-1											1				1								
NC2-1-2																1	3	6	5	3			
SUBTOTAL											1				1	1	3	6	5	3			
PEOPLE TO PEOPLE LINKS																							
NC3-1-1				1	1	3	3					1	2	1		1	1	1		1	2		
NC3-1-2												1	2	3	5	1		1	3	1			
NC3-1-3														2	4	9	10	3			3	7	2
SUBTOTAL				1	1	3	3					2	4	6	9	11	11	5	3	2	5	7	2
INTRAGOVERNMENT LINKS																							
NC4-1-1								1	1	3													
NC4-1-2														1	1			1	1				
NC4-2-1						2	1						1										
NC4-2-2						1		2		3	3												
SUBTOTAL						3	1	3	2	5	3	3	2	1	3	2	1	1	2	4			1
ENTERTAINMENT/COMMERCIAL LINKS																							
NC5-1-1						1	1	3	3			1	2		1	2	2	1	1	1	2		
NC5-1-2												1	3	5	4	4	3	1		2	3	1	
SUBTOTAL						1	1	3	3			2	5	5	5	6	5	2	1	3	5	1	
PLANETARY																							
NL1-1-1																							
NL1-1-2																							
NL1-1-3										1	1												
NL1-1-4																							
NL1-1-5																							
NL1-1-6											2												
NL1-1-7																							
NL1-1-8																							
NL1-1-9														1									
NL1-1-10																1							
NL1-1-11																	1						
NL1-1-12																		1					
SUBTOTAL											1	3		1	1	1	1	1					
LUNAR																							
NL2-1-1																							
SUBTOTAL																							

VIII-42

TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1			1			1					1							1				
NO1-1-2										1	1				1				1			
NO1-1-3									1			1						1				
NO1-1-4													1									
NO1-1-5													1									
NO1-1-6						1																
NO1-1-7						1					1									1		
NO1-1-8											2									1		
NO1-2-1																						

SUBTOTAL

ENVIRONMENTAL MONITORING

NO2-1-1			1			2					2	4	2	2		1			2	3		
NO2-1-2			1			2																
NO2-1-3			1				1	1	1				1									
NO2-1-4											1	1						1				1
NO2-1-5									1													
NO2-2-1																						
NO2-2-2																						
SUBTOTAL			2		2	1	1	2			1	2						2				1

ASTROPHYSICS

NP1-1-1							2											1				
NP1-1-2			1	2				1	1					1		1						
NP1-1-3								1	2		1				1			1				
NP1-1-4A											1						1					
NP1-1-4B														1	1							
NP1-1-5											1		1									
NP1-1-6								1	1													
NP1-1-7																						
NP1-1-8						1																
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						

SUBTOTAL

SOLAR TERRESTRIAL

NP2-1-1								1	1						1					1		
NP2-1-2									1													
NP2-1-3			1	1				1			1	1		1	1		1	1		1		1
NP2-1-4			1							1		1				1			1			
NP2-1-5						1									1						1	
NP2-2-1														1	2							
NP2-2-2																						
NP2-2-3																						
NP2-2-4																						
SUBTOTAL			2	1	1			2	2	1	1	2		3	4		2	1	2	1	1	1

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TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1 1 1 1 1

NP3-1-2 1

NP3-2-1

NP3-2-2

NP3-2-3

NP3-2-4

NP3-3-1 2 3

SUBTOTAL 1 1 1 1 2 4

SPACE PROCESSING-SPACE STATION

NS1-2-1 2 3

SUBTOTAL 2 3

SPACE INDUSTRIALIZATION

NS2-1-1 1 2 3 5 1

NS2-1-2

NS2-1-3 1 4 6 6 3

NS2-1-4

NS2-1-5

SUBTOTAL 1 2 3 5 2 4 6 6 3

ORBITAL OPERATIONS

NS3-1-1 1 1 3 3 1 2 1 2 1 1 1 2 2 3

NS3-1-2

NS3-1-3 3 7 2

NS3-1-4

NS3-1-5

NS3-1-6

SUBTOTAL 1 4 10 5 1 2 1 2 1 1 1 2 2 3

SATELLITE POWER

NS4-1-1

NS4-1-2 1 7 4

NS4-1-3 9 19 6

NS4-1-4 8 26 50 59 22

SUBTOTAL 1 7 4 9 27 32 50 59 50 82 254 553 571 456 646 646 189

TOTAL

NASA 1 7 20 22 25 22 28 50 56 75 83 81 115 280 578 593 475 657 656 193

(MILLIONS OF 1977 DOLLARS)

NASA MISSIONS

NC1-1-1

NC1-1-2

HC1-1-3

NC1-1-3
NC1-1-4

NC1-1-4
SUBTOTAL

HC2-1-1

NC2-1-2

SUBTOTAL

HC3-1-1

NC3-1-2

NC3-1-3

NC 3-1-3
SUBTOTAL

NC4-1-1

NC4-1-2

NC4-2-1

NC4-2-2

NC4-2-2
SUBTOTAL

HC5-1-1

NC5-1-2

SUBTOTAL

HL1-1-1

NL1-1-2

11. $1 = 1 = 3$

ML 1-1-4

NL1-1-4

NL1-1-5

HL1-1-6

NL1-1-7

NL1-1-8

141-1-9

NY 1-1-10

ALL 1-1-11

RL1-1-11
RL1-1-12

NL1-1-12

41 2-1-1

NL2=1#1
 SUBTOTAL

SUBTOTAL

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

HASA (CONTINUED)

EARTH RESOURCES MONITORING

HO1-1-1			3	3					2			2			2			2			2
HO1-1-2								1	3	1	1	1	1	1	1	1	1	1	1	1	
HO1-1-3									3	3			1	1	1		1	1	1	1	
HO1-1-4												1	3	1			1	1		2	
HO1-1-5												1	3								
HO1-1-6													1	3							
HO1-1-7																					
HO1-1-8											1	1	1			2			1	1	1
HO1-2-1										1	3	2			1	1			1		

SUBTOTAL			3	9	6			3	7	8	8	9	3	5	3	2	4	3	4	3	
----------	--	--	---	---	---	--	--	---	---	---	---	---	---	---	---	---	---	---	---	---	--

ENVIRONMENTAL MONITORING

HO2-1-1					1	4	4	1													
HO2-1-2							1	3	2	2				1	1	1			2		
HO2-1-3					1	3	1														
HO2-1-4										1	3	2	2		2	1		2		1	2
HO2-1-5								2	2												
HO2-2-1																					
HO2-2-2																					
SUBTOTAL			2	7	6	4	4	4	1	5	2	2	1	3	2		2	2	1	2	

ASTROPHYSICS

NP1-1-1						4	8	3		2	3	1					1	3	1		
NP1-1-2			1	6	6	4	3	3	3	1			1	3	1						
NP1-1-3							1	5	5	2	3			1	3	1	1	1	2	1	
NP1-1-4A									2	3	1				1	1					
NP1-1-4B																					
NP1-1-5									1	2		2	4	1					1	1	1
NP1-1-6											2										
NP1-1-7							2	4													
NP1-1-8			1	3	1	1									2	3	1				

NP1-2-1																					
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NP1-2-2																					
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NP1-2-3																					
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NP1-2-4																					
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUBTOTAL			1	4	7	13	17	11	11	12	10	4	5	8	8	3	2	6	3	1	
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SOLAR TERRESTRIAL																					
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NP2-1-1						1	3	1	1	1	1	1		1	1	1	1	1	1		
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NP2-1-2							3	2													
---------	--	--	--	--	--	--	---	---	--	--	--	--	--	--	--	--	--	--	--	--	--

NP2-1-3			1	3	2	2	1	1	1	2	2	2	3	2	3	2	2	3	2	3	1
---------	--	--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

NP2-1-4			1	3	2	2	1	1	1	2	2	2	3	2	3	2	2	3	2	3	1
---------	--	--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

NP2-1-5																					
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NP2-2-1													2	8	9	2					
---------	--	--	--	--	--	--	--	--	--	--	--	--	---	---	---	---	--	--	--	--	--

NP2-2-2																					
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NP2-2-3																					
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NP2-2-4																					
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUBTOTAL			2	6	4	4	3	8	5	5	5	5	5	9	12	16	7	5	7	5	7
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VIA-46

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1 1 2 3 3 3 2

NP3-1-2 1 1 2

NP3-2-1

NP3-2-2

NP3-2-3

NP3-2-4

NP3-3-1 1 4 5 2

SUBTOTAL 1 2 4 3 3 4 6 5 2

SPACE PROCESSING-SPACE STATION

NS1-2-1 1 5 5 2

SUBTOTAL 1 5 5 2

SPACE INDUSTRIALIZATION

NS2-1-1 1 5 7 8 3

NS2-1-2

NS2-1-3 2 6 11 11 4

NS2-1-4

NS2-1-5

SUBTOTAL 1 5 7 8 5 6 11 11 4

ORBITAL OPERATIONS

NS3-1-1 1 4 6 5 4 4 2 4 1 2 3 3 5 5 1

NS3-1-2

NS3-1-3 6 13 5

NS3-1-4

NS3-1-5

NS3-1-6

SUBTOTAL 1 10 19 10 4 4 2 4 1 2 3 3 5 5 1

SATELLITE POWER

NS4-1-1 2 12 10

NS4-1-2 17 40 15

NS4-1-3 19 57 101 111 41

NS4-1-4 51 155 436 914 934 744 1052 1051 308

SUBTOTAL 2 12 10 17 59 72 101 111 92 155 436 914 934 744 1052 1051 308

TOTAL

NASA 3 24 58 66 72 74 81 132 144 167 177 166 241 507 971 987 786 1096 1074 313

V-111-47

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1	1	5	8	2																		
CC1-1-2		1	6	8	6	9	9	6	1													
CC1-1-3								1	4	7	7	6	3	1	4	4	1					
SUBTOTAL	1	6	14	10	6	9	9	7	5	7	7	6	3	1	4	4	1					

US DOMESTIC COMMUNICATION

CC2-1-1			3	4	4	2		1	1		1	2	1	1	1			1	2	1		
CC2-1-2		3	5	2																		
CC2-1-3					1	4	6	5				1	2	1		1	4	6	6	2	1	
CC2-1-4	2	4				1	1															
CC2-1-5		1	3	2																		
CC2-1-6					1	4	3	1						2	3				1	1		
CC2-1-7											2	6	3					1	3	2	1	
CC2-1-8											2	5	3									
CC2-1-9									2	7	3											
CC2-1-10							1	4	6	5	2	1		1	6	5	3	1				
CC2-1-11									1	4	5	1					1	2				
CC2-1-12												1	3	5	6	1		1	4	4	1	
CC2-1-13											2	4	3									
CC2-1-14						2	4	2	2	2	2	1	1	3	1	1	1					
SUBTOTAL	2	8	11	8	6	11	13	15	12	24	28	16	9	14	14	8	10	14	15	9	2	

FOREIGN COMMUNICATION

CC3-1-1				2	4	3	1															
CC3-1-2											2	5	2	1					2	2	1	
CC3-1-4				2	4	3	1															
CC3-1-5							2	4	3	1						2	2					
CC3-1-6		1	4	2																		
CC3-1-7				2	4	3		1	2	1	1						2	2				
CC3-1-8	1	3	3	1																		
CC3-1-9					1	3	3	1		1	1	1		1	1	1		1	1	1		
CC3-1-10			1	2																		
CC3-1-11		1	2	1																		
CC3-1-12			1	4	1																	
CC3-1-13				2	4	3	1															
CC3-1-14											2	5	2	1					2	2	1	
CC3-1-16							2	3	3							1	2	1	1			
CC3-1-17				2	6	3	1															
CC3-1-18											2	6	4						1	4	4	1
CC3-1-20								2	4							1	1					
CC3-1-21					2	4	3															
CC3-1-22											2	4	3	1							1	1
CC3-1-23						2	5	3														
CC3-1-24							2	8	4					1	4	3		5	3			
CC3-1-26																						
CC3-1-28			1	2	1																	
CC3-1-30		2	4	2																		
CC3-1-32					3	6	1				1	2	1		1	2						
CC3-1-33		1	4	2																		
CC3-1-35					2	6	3	2	1	1												

84-1117

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

FOREIGN COMMUNICATION (CONT.)

CC3-1-36

CC3-1-37

CC3-1-38

CC3-1-39

CC3-1-40

SUBTOTAL

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1

CO1-1-2

CO1-1-3

CO1-2-1

SUBTOTAL

EARTH AND OCEAN MONITORING

CO2-1-1

SUBTOTAL

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1

CO3-1-2

CO3-1-3

CO3-1-4

CO3-2-1

CO3-2-2

CO3-2-3

CO3-2-4

CO3-2-5

CO3-2-6

SUBTOTAL

WEATHER

CO4-1-2

CO4-1-3

CO4-2-2

CO4-2-4

CO4-2-5

SUBTOTAL

US DOMESTIC

CP1-1-1

SUBTOTAL

FOREIGN

CP2-1-3

CP2-1-5

CP2-1-6

CP2-1-7

CP2-1-8

CP2-1-14

CP2-1-15

CP2-1-16

SUBTOTAL

67-1117

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

DISASTER WARNING

CS1-1-1 1 5 8 5 1 2 4 4 1

SUBTOTAL 1 5 8 5 1 2 4 4 1

TRAFFIC MANAGEMENT

CS2-1-1 2 7 3

CS2-1-2 2 7 4

CS2-1-3 1 3 2 1 1 2

SUBTOTAL 1 3 4 8 3 2 7 5 2

SPACE MANUFACTURING-US DOMESTIC AND FOREIGN

CS3-1-1

CS3-1-2

CS3-1-3

CS3-1-4

CS3-2-1

CS3-2-2

CS3-2-3

CS3-2-4

CS3-2-5

SUBTOTAL

USERS TOTAL

OUTSIDE 4 18 37 73 80 80 84 86 74 74 82 85 71 72 81 74 77 64 56 40 12

ALL PROGRAMS

TOTAL 4 21 61 131 146 152 158 167 206 218 249 262 237 313 588 1045 1064 850 1152 1114 325

95-1117

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

HC1-1-1	6	66	141	51		6	25	49	17		6	24	49	18								
HC1-1-2		18	58	93	94	35		6	31	63	22		6	31	63	22						
HC1-1-3			23	74	114	111	39		6	34	70	24		6	34	69	24					
HC1-1-4						28	88	137	132	49		6	40	82	29							
SUBTOTAL	6	84	222	218	208	180	152	192	186	146	98	54	95	137	126	91	24					

GOVERNMENT TO PEOPLE LINKS

HC2-1-1							17	52	54	16	6	12	22	7	6	11	22	7				
HC2-1-2													38	120	195	199	73					
SUBTOTAL							17	52	54	16	6	12	60	127	201	210	95	7				

PEOPLE TO PEOPLE LINKS

HC3-1-1	36	112	174	169	62		6	51	106	37	6	49	106	37	6	51	105	37				
HC3-1-2								41	129	203	201	73	6	61	126	45						
HC3-1-3										48	152	245	248	91		6	76	160	57			
SUBTOTAL	36	112	174	169	62		6	92	235	288	359	367	360	189	132	102	181	197	57			

INTRAGOVERNMENT LINKS

NC4-1-1			28	88	137	132	49	6	40	82	29	6	40	83	29							
NC4-1-2					33	107	166	164	59	6	49	102	36	6	49	103	36					
NC4-2-1	6	67	142	51			6	25	50	17		6	25	50	18							
NC4-2-2		28	88	137	132	49			6	40	82	29		6	40	83	29					
SUBTOTAL	6	95	230	216	220	219	239	221	195	155	145	160	137	82	114	134	161	119	29			

ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1		29	94	144	139	50	6	41	86	36	41	91	72	85	36	41	86	30				
NC5-1-2								39	121	189	191	121	115	40	6	54	115	40				
SUBTOTAL		29	94	144	139	50	6	80	207	225	232	212	187	125	42	95	201	70				

PLANETARY

NL1-1-1							9	51	57	16			19	31	9							
NL1-1-2					10	54	62	17						20	32	10						
NL1-1-3						1	26	50	15						1	15	21	6				
NL1-1-4			6	23	41	24	5							6	15	23	18	5				
NL1-1-5				12	38	73	24							6	12	21	6					
NL1-1-6								16	77	87	25											
NL1-1-7					10	54	61	18								19	33	9				
NL1-1-8						7	32	63	22													
NL1-1-9							7	24	46	16												
NL1-1-10									7	29	57	19										
NL1-1-11											20	34	10									
NL1-1-12										17	51	97	99	34								
SUBTOTAL			6	45	144	255	247	193	185	183	199	171	107	69	88	78	20					

LUNAR

NL2-1-1	25	41	14																			
SUBTOTAL	25	41	14																			

VIII-51

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1	11	48	52	16	10	22	7	11	20	8	10	21	8	10	21	7	10	22	7		
NO1-1-2						21	44	22	13	11	12	11	13	11	12	11	13	5			
NO1-1-3						17	52	57	23	15	26	15	13	26	15	14	27	8			
NO1-1-4									18	39	14										
NO1-1-5								6	12	24	8										
NO1-1-6		17	57	62	19																
NO1-1-7		17	58	63	20		6	17	30	10	6	16	30	10	6	17	30	10			
NO1-1-8						6	18	34	11	6	9	14	4	6	9	14	4				
NO1-2-1			9	22	14	10	9	10	9	10	9	9	9	10	9	10	9	7	1		
SUBTOTAL	11	82	176	163	63	76	136	157	136	123	94	86	77	73	72	73	93	52	8		

ENVIRONMENTAL MONITORING

NO2-1-1	14	62	70	23																	
NO2-1-2			9	41	44	14	9	18	7		9	17	7		9	18	7				
NO2-1-3	25	54	20																		
NO2-1-4								16	47	52	22	13	24	14	13	24	14	14	24	8	
NO2-1-5			6	8	26	17															
NO2-2-1			1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1			
NO2-2-2			1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1			
SUBTOTAL	39	116	107	74	72	35	27	69	61	26	24	45	23	17	35	36	23	26	8		

ASTROPHYSICS

NP1-1-1				35	74	27		14	26	9						13	26	9			
NP1-1-2		10	45	48	25	21	17	20	7		10	21	7								
NP1-1-3					10	45	47	25	20	7		10	19	7	9	21	7				
NP1-1-4A						6	17	31	10			6	9	13	4						
NP1-1-4B									6	15	29	9				6	8	11	4		
NP1-1-5								15	32	17	10	9	9	3							
NP1-1-6								7	16	5											
NP1-1-7				23	49	17									29	61	22				
NP1-1-8	1	8	17	8	5	2															
NP1-2-1				2	4	4	5	4	5	4	5	4	5	4	5	4	5	4	3		
NP1-2-2				1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2		
NP1-2-3				1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1		
NP1-2-4								1	2												
SUBTOTAL	1	8	27	57	119	168	126	104	140	112	56	56	94	107	52	40	65	35	10		

SOLAR TERRESTRIAL

NP2-1-1					15	29	15	9	7	8	8	9	7	8	8	9	7	8	3		
NP2-1-2					3	18	14														
NP2-1-3	12	23	21	16	15	10	12	14	17	20	18	19	19	19	18	19	19	17	11	3	
NP2-1-4	10	24	20	15	12	8	7	8	12	12	13	12	13	12	13	12	13	12	9	2	
NP2-1-5											13	63	68	21							
NP2-2-1							1	1	1	2	1	2	1	2	1	2	1	1			
NP2-2-2							1	3	3	3	3	3	3	3	3	3	3	2			
NP2-2-3							2	4	4	5	4	5	4	5	4	5	4	3			
NP2-2-4					4	11	17	18	18	18	18	18	18	18	18	18	18	18	11	2	
SUBTOTAL	22	47	41	31	49	76	69	57	62	68	78	131	133	88	65	68	65	61	34	7	

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1 16 76 99 95 99 61 12

NP3-1-2 14 41 80 92 34

NP3-2-1 1 3 3 3 3 2

NP3-2-2 1 1 1 2 1 1

NP3-2-3 1 1 1 2 1 1

NP3-2-4 1

NP3-3-1 24 113 127 40

SUBTOTAL 14 42 99 173 138 102 128 178 139 40

SPACE PROCESSING-SPACE STATION

HS1-2-1 24 113 127 40

SUBTOTAL 24 113 127 40

SPACE INDUSTRIALIZATION

HS2-1-1 200 600 1084 1196 443

NS2-1-2 6 13 15 15 15 15 15 15 15 9 2

NS2-1-3 165 495 963 1072 381

NS2-1-4 16 35 39 39 39 39 38 24 4

NS2-1-5 18 23 4

SUBTOTAL 200 600 1102 1225 625 510 994 1122 435 54 54 54 54 53 33 6

ORBITAL OPERATIONS

NS3-1-1 20 60 94 84 55 48 40 40 16 25 48 40 73 64 16

NS3-1-2 1 2 1 2

NS3-1-3 40 84 30

NS3-1-4 1 1 1 1 1 1

NS3-1-5 3 4

NS3-1-6 3 4 3 4 1 3 4

SUBTOTAL 20 100 179 123 63 50 43 49 17 5 4 26 48 41 74 68 20 1 1

SATELLITE POWER

NS4-1-1 3 19 15

NS4-1-2 19 42 15

NS4-1-3 19 57 105 117 41

NS4-1-4 51 155 488 1031 1038 841 1201 1162 327

SUBTOTAL 3 19 15 19 61 72 105 117 92 155 488 1031 1038 841 1201 1162 327

TOTAL

NASA 63 409 1040 1390 1582 1819 2228 2529 2141 2029 2393 2589 2049 2013 2366 2128 1786 2077 1634 413

V/11-55

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

FOREIGN COMMUNICATION (CONT.)

CC3-1-36								1	18	40	24	9	10	3								
CC3-1-37															1	26	62	45	31	29	23	5
CC3-1-38			1	17	38	22	4			1	5	13	9	11	3							
CC3-1-39									1	27	64	46	22	5			2	10	26	31	22	7
CC3-1-40						1	19	36	13	1	6	12	5	1	5	12	4	2	6	13	3	
SUBTOTAL	11	86	202	311	365	369	373	308	209	149	186	229	165	114	164	197	154	126	177	128	30	

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1												10	45	51	26	22	18	22	8		
CO1-1-2			32	71	41	7															
CO1-1-3						1	26	62	44	23	15	24	30	22	15	24	21	6			
CO1-2-1							13	60	68	21				14	30	10					
SUBTOTAL			32	71	41	8	39	122	112	44	25	69	81	62	67	52	43	14			

EARTH AND OCEAN MONITORING

CO2-1-1												16	94	137	92	100	211	284	276	192	51
SUBTOTAL												16	94	137	92	100	211	284	276	192	51

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1						23	54	36	23	30	42	45	46	52	63	67	49	13			
CO3-1-2								25	53	18	9	16	14	17	13	16	7				
CO3-1-3												6	27	62	32	23	8				
CO3-1-4													6	27	62	32	23	8			
CO3-2-1						25	54	19	9	18	6										
CO3-2-2												26	53	19	9	18	6				
CO3-2-3						12	26	8													
CO3-2-4								24	50	26	15	13	15	12	15	13	15	5			
CO3-2-5													6	31	64	39	7				
CO3-2-6															6	27	55	19			
SUBTOTAL						60	134	112	135	92	72	106	167	220	264	235	170	45			

WEATHER

CO4-1-2	25	61	47	34	33	33	34	33	26	10											
CO4-1-3								10	44	54	38	30	30	30	31	30	22	6			
CO4-2-2				1	22	43	17	1	7	14	6	1	7	14	5	2	7	15	5		
CO4-2-4				6	29	59	19	6	13	22	7	6	12	23	13	12	22	7			
CO4-2-5			6	29	58	25	13	21	14	11	22	13	12	22	12	13	21	6			
SUBTOTAL	25	61	53	70	142	160	83	71	104	111	73	50	61	89	61	57	72	34	5		

US DOMESTIC

CP1-1-1								19	43	31	20	21	20	21	20	21	32	49	29	16	4
SUBTOTAL								19	43	31	20	21	20	21	20	21	32	49	29	16	4

FOREIGN

CP2-1-3			17	34	13																
CP2-1-5				16	32	12															
CP2-1-6							15	31	11	4	9	2			4	8	4				
CP2-1-7			6	14	36	17	17	12	18	10	18	12	18	11	18	11	18	11	12	3	
CP2-1-8			6	22	40	29	12	14	3		6	14	21	17	3	7	15	22	17	3	
CP2-1-14			13	25	10																
CP2-1-15				5	17	12															
CP2-1-16					21	50	39	26	27	27	27	27	28	25	27	27	28	26	19	5	
SUBTOTAL			42	116	169	120	83	83	63	51	63	57	69	68	59	53	71	63	48	11	

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TOTAL PROGRAM COSTS BY FISCAL YEAR THPOUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996				
OTHER USERS (CONTINUED)																											
DISASTER WARNING																											
CS1-1-1											11	46	58	36	7	1	12	31	27	7							
SUBTOTAL											11	46	58	36	7	1	12	31	27	7							
TRAFFIC MANAGEMENT																											
CS2-1-1													12	37	64	34	5										
CS2-1-2															12	39	68	38	5								
CS2-1-3									6	33	65	38	6	6	17	31	26	6									
SUBTOTAL									6	33	77	75	70	46	50	85	69	31	6								
SPACE MANUFACTURING-US DOMESTIC AND FOREIGN																											
CS3-1-1								1	2	5	5	7	8	9	10	9	10	9	10	5	1						
CS3-1-2										1	1	2	2														
CS3-1-3												1	1					1	1								
CS3-1-4												1	2	4	4	3	4	6	7	7	5	1					
CS3-2-1									1	1	2	2	2	2	3	3	4	2	1								
CS3-2-2										1	1	2	2														
CS3-2-3												1	1					1	1								
CS3-2-4												1	2	4	4	3	4	6	7	7	5	1					
CS3-2-5							1	1	2	2	2	2	1	1	2	2	1	1	2	1	2						
SUBTOTAL							1	1	2	3	3	10	11	18	21	21	23	19	25	27	26	21	11	2			
USERS TOTAL																											
OUTSIDE							53	253	592	883	1020	970	1043	1038	1018	969	995	970	989	1043	1091	1057	1068	893	757	496	121
ALL PROGRAMS																											
TOTAL							53	322	1135	2302	2983	3225	3651	4228	4727	4228	4287	4772	5048	4685	4833	4942	4933	4662	4778	3977	1091

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Appendix IX

Nominal and Optimistic Budget

Program Cost Summaries

PRECEDING PAGE BLANK NOT FILMED

PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC N R M D	EXP	LAUNCH VEHICLE TRAFFIC			SHTL	RDTE	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
			IUS	TUG				INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	
NASA MISSIONS																
INTERGOVERNMENT LINKS																
NC1-1-1	3	2.1	3.0			167	242			409	49		49	458		
NC1-1-2	3	2.4	3.0			176	312			488	54		54	542		
NC1-1-3	3	2.4	3.0			228	346			574	54		54	628		
NC1-1-4	2	1.6	2.0			276	279			555	36		36	591		
SUBTOTAL	11	8.5	11.0			847	1179			2026	193		193	2219		
GOVERNMENT TO PEOPLE LINKS																
NC2-1-1	3	2.1	3.0			93	90			183	49		49	232		
NC2-1-2	1	.9	1.0			381	225			606	19		19	625		
SUBTOTAL	4	3.0	4.0			474	315			789	68		68	857		
INTRAGOVERNMENT LINKS																
NC4-1-1	3	2.4	3.0			276	419			695	54		54	749		
NC4-1-2	3	2.4	3.0			335	527			862	54		54	916		
NC4-2-1	3	2.4	3.0			167	242			409	54		54	463		
NC4-2-2	3	2.4	3.0			276	419			695	54		54	749		
SUBTOTAL	12	9.6	12.0			1054	1607			2661	216		216	2877		
PLANETARY																
NL1-1-1	2	4.0				75	69			144	48		48	192		
NL1-1-2	2	4.0				82	75			157	48		48	205		
NL1-1-3	2	4.0	2.0			50	35			85	50		50	135		
NL1-1-4	4	4.0	4.0			32	50			82	84		84	166		
NL1-1-5	3	3.0	3.0			56	73			129	63		63	192		
NL1-1-6	1	2.0	1.0			123	57			180	25		25	205		
NL1-1-7	2	4.0				61	75			156	48		48	204		
NL1-1-8	1	1.0	2.0			70	32			102	22		22	124		
NL1-1-9	1	1.0	2.0			51	20			71	22		22	93		
NL1-1-10	1	1.0	2.0			63	27			90	22		22	112		
NL1-1-11	1	2.0				30	10			40	24		24	64		
NL1-1-12	1	3.0				170	89			259	39		39	298		
SUBTOTAL	21	33.0	16.0			883	612			1495	495		495	1990		
LUNAR																
NL2-1-1	1	1.0				34	9			43	34	3	37	80		
SUBTOTAL	1	1.0				34	9			43	34	3	37	80		
EARTH RESOURCES MONITORING																
NO1-1-1	6	.6				89	223			312	9		9	321		
NO1-1-2	6	.6				57	133			190	9		9	199		
NO1-1-3	4	2.8	4.0			89	153			242	66		66	308		
NO1-1-4	1	.1				53	17			70	1		1	71		
NO1-1-5	1	.7	1.0			26	8			34	16		16	50		
NO1-1-6	1	.8	1.0			94	43			137	18		18	155		
NO1-1-7	4	4.0	4.0			96	166			262	84		84	346		
NO1-1-8	3	2.4	3.0			36	45			81	54		54	135		
NO1-2-1	15	1.5				26	118			144	22		22	166		
SUBTOTAL	41	13.5	13.0			566	906			1472	279		279	1751		

PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC N R H D	EXP	LAUNCH VEHICLE TRAFFIC			SHTL	RDTE	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
			IUS	TUG				INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	
NASA (CONTINUED)																
ENVIRONMENTAL MONITORING																
NO2-1-1	1	.2					113	53			166	3			3 169	
NO2-1-2	4	.4					75	128			203	6			6 209	
NO2-1-3	1	.1					69	29			98	1			1 99	
NO2-1-4	4	2.8	4.0				80	139			219	66			66 285	
NO2-1-5	1	1.0	1.0				27	9			36	21			21 57	
NO2-2-1	15	1.5										22			22 22	
NO2-2-2	15	1.5										22			22 22	
SUBTOTAL	41	7.5	5.0				364	358			722	141			141 863	
ASTROPHYSICS																
NP1-1-1	3	2.1					88	114			202	31			31 233	
NP1-1-2	4	.4					81	144			225	6			6 231	
NP1-1-3	4	.4					81	140			221	6			6 227	
NP1-1-4A	2	2.0	2.0				32	22			54	42			42 96	
NP1-1-4B	2	1.4	2.0				32	23			55	33			33 88	
NP1-1-5	3	.3					41	50			91	4			4 95	
NP1-1-6	2	.2					62	52			114	3			3 117	
NP1-1-7	2	.1					61	50			111	1			1 112	
NP1-1-8	2	.4	2.0				19	14			33	8			8 41	
NP1-2-1	15	4.5										67			67 67	
NP1-2-2	15	3.0										45			45 45	
NP1-2-3	15	1.5										22			22 22	
NP1-2-4	1	.2										3			3 3	
SUBTOTAL	70	16.5	6.0				497	609			1106	271			271 1377	
SOLAR TERRESTRIAL																
NP2-1-1	7	.7					39	101			140	10			10 150	
NP2-1-2	1	.1					27	7			34	1			1 35	
NP2-1-3	29	7.9	25.0				23	174			197	123	2		125 322	
NP2-1-4	29	21.4					22	159			181	141			141 322	
NP2-1-5	1	.3					112	49			161	4			4 165	
NP2-2-1	11	1.1										16			16 16	
NP2-2-2	11	2.2										33			33 33	
NP2-2-3	11	3.3										49			49 49	
NP2-2-4	27	16.2										243			243 243	
SUBTOTAL	127	53.2	25.0				223	490			713	620	2		622 1335	
LIFE SCIENCES																
NP3-1-1	5	.5					137	314			451	7			7 458	
NP3-1-2	1	.1					137	123			260	1			1 261	
NP3-2-1	10	1.0										15			15 15	
NP3-2-2	10	.5										7			7 7	
NP3-2-3	10	.5										7			7 7	
NP3-2-4	1	.1										1			1 1	
NP3-3-1	1	.3					200	100			300	4			4 304	
SUBTOTAL	38	3.0					474	537			1011	42			42 1053	

PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				EXP	LAUNCH VEHICLE TRAFFIC			SHTL	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
	N	R	M	D		IUS	TUG	ROTE		INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	
NASA (CONTINUED)																		
SPACE PROCESSING-SPACE STATION																		
IS1-2-1	1				.3			200	100			300	4		4	304		
SUBTOTAL	1				.3			200	100			300	4		4	304		
ORBITAL OPERATIONS																		
IS3-1-1	6				5.4			200	450			650	81		81	731		
IS3-1-2	3				.6								9		9	9		
IS3-1-3	1				.3			100	50			150	4		4	154		
IS3-1-4	6				.6								9		9	9		
IS3-1-5	1				.5								7		7	7		
IS3-1-6	3				1.5								22		22	22		
SUBTOTAL	20				8.9			300	500			800	132		132	932		
SATELLITE POWER																		
IS4-1-1	1				.1			26	10			36	1		1	37		
IS4-1-2	1				.1			42	26			75	1		1	76		
IS4-1-3	3				2.1			190	418			608	31		31	639		
SUBTOTAL	5				2.3			265	454			719	33		33	752		
TOTAL																		
NASA	392				160.3	92.0		6181	7676			13857	2528	5	2533	16390		

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PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC			EXP	LAUNCH VEHICLE TRAFFIC		SHTL	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
	N	R	H D		IUS	TUG		RDTE	INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	

OUTSIDE USERS (NON-NASA, NON-DOO)																
INTERNATIONAL COMMUNICATIONS																
CC1-1-1	4			4.0				151			151	74	64		138	289
SUBTOTAL	4			4.0				151			151	74	64		138	289
US DOMESTIC COMMUNICATION																
CC2-1-1	11			2.6	11.0			71	271		342	62			62	404
CC2-1-2	1			1.0				53	21		74	18	16		34	108
CC2-1-4	2			1.2	1.0			37	36		73	14	1		15	88
CC2-1-5	1			1.0				46	18		64	9	1		10	74
CC2-1-6	7			1.4	7.0			47	127		174	35			35	209
CC2-1-7	6			1.2	6.0			37	80		117	30			30	147
CC2-1-8	2			.4	2.0			46	38		84	10			10	94
CC2-1-9	3			.6	3.0			41	50		91	14			14	105
CC2-1-11	2			1.4	2.0			76	66		142	39			39	181
CC2-1-12	6			4.4	6.0			105	257		362	121			121	483
SUBTOTAL	41			15.2	38.0			559	964		1523	352	18		370	1893
FOREIGN COMMUNICATION																
CC3-1-1	2			.4	2.0			40	33		73	10			10	83
CC3-1-2	4			.8	4.0			44	70		114	20			20	134
CC3-1-4	2			.4	2.0			40	31		71	10			10	81
CC3-1-5	4			.8	4.0			40	61		101	20			20	121
CC3-1-6	1			1.0				39	13		52	9	1		10	62
CC3-1-10	1			.2	1.0			42	17		59	5			5	64
CC3-1-11	1			1.0				20	5		25	9	1		10	35
CC3-1-12	1			.2	1.0			35	11		46	5			5	51
CC3-1-13	2			.4	2.0			40	31		71	10			10	81
CC3-1-14	4			.8	4.0			43	68		111	20			20	131
CC3-1-16	4			.8	4.0			64	102		166	20			20	186
CC3-1-17	3			.6	3.0			39	46		85	14			14	99
CC3-1-18	7			1.4	7.0			47	119		166	35			35	201
CC3-1-20	2			.4	2.0			38	30		68	10			10	78
CC3-1-21	2			.4	2.0			39	31		70	10			10	80
CC3-1-22	3			.6	3.0			41	48		89	14			14	103
CC3-1-23	2			.4	2.0			46	38		84	10			10	94
CC3-1-24	2			.4	2.0			48	39		87	10			10	97
CC3-1-26	6			1.2	6.0			67	157		224	30			30	254
CC3-1-28	1			.2	1.0			20	5		25	5			5	30
CC3-1-30	3			1.4	2.0			46	58		104	44	3		47	151
CC3-1-32	3			.6	3.0			48	58		106	14			14	120
CC3-1-33	1			.2	1.0			39	13		52	5			5	57
CC3-1-35	3			.6	3.0			67	83		150	14			14	164
CC3-1-36	3			.6	3.0			45	46		91	14			14	105
CC3-1-37	5			1.0	5.0			67	130		197	25			25	222
CC3-1-38	4			.8	4.0			41	63		104	20			20	124
CC3-1-39	6			1.2	6.0			70	163		233	30			30	263
CC3-1-40	4			.8	4.0			46	73		119	20			20	139
SUBTOTAL	86			19.6	83.0			1301	1642		2943	462	5		467	3410

PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				EXP	LAUNCH VEHICLE TRAFFIC			SHTL	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL	
	N	R	M	D		IUS	TUG			RDTE	INV	OPS	LOSS	TOTAL	INV	OPS	LOSS		TOTAL
OTHER USERS (CONTINUED)																			
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN																			
CO1-1-1	3				.3							82	114		196	6	6	202	
CO1-1-2	3				3.0							52	70		122	27	2	29	151
CO1-2-1	2				.2							108	104		212	4		4	216
SUBTOTAL	8				3.5							242	288		530	37	2	39	569
EARTH AND OCEAN MONITORING																			
CO2-1-1	6				1.6							137	364		501	30		30	531
SUBTOTAL	6				1.6							137	364		501	30		30	531
EARTH RESOURCES-US DOMESTIC AND FOREIGN																			
CO3-1-1	21				1.8							66	443		509	34		34	543
CO3-2-1	2				.2							65	62		127	4		4	131
CO3-2-2	2				.2							66	61		127	4		4	131
CO3-2-3	1				.1							32	12		44	2		2	46
SUBTOTAL	26				2.3							229	578		607	44		44	651
WEATHER																			
CO4-1-2	8				8.0							69	211		280	16	40	56	336
CO4-1-3	8				.8							84	226		310	15		15	325
CO4-2-2	4				.8			4.0				55	92		147	20		20	167
SUBTOTAL	20				9.6			4.0				208	529		737	51	40	91	828
US DOMESTIC																			
CP1-1-1	9				.9							51	166		217	17		17	234
SUBTOTAL	9				.9							51	166		217	17		17	234
FOREIGN																			
CP2-1-3	1				1.0							40	14		54	9	1	10	64
CP2-1-5	3				1.2							36	41		77	13	1	14	91
CP2-1-6	4				.4							40	62		102	8		8	110
CP2-1-7	8				5.6			8.0				30	77		107	155		155	262
CP2-1-8	7				4.9			7.0				33	82		115	136		136	251
CP2-1-14	1				1.0							29	9		38	9	1	10	48
CP2-1-15	1				1.0							19	5		24	9	1	10	34
SUBTOTAL	25				15.1			15.0				227	290		517	339	4	343	860
USERS TOTAL																			
OUTSIDE	225				71.8			140.0				2954	4972		7926	1406	133	1539	9465
ALL PROGRAMS																			
TOTAL	913				483.1			355.0				10368	18708	121	29197	7882	425	8307	37504
USERS TOTAL																			
OUTSIDE	225				71.8			140.0				2954	4972		7926	1406	133	1539	9465

PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

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SATELLITE NAME	PAYLOAD TRAFFIC				EXP	LAUNCH VEHICLE TRAFFIC			SHTL	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
	N	R	M	D		IUS	TUG	ROTE		INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	

NASA MISSIONS																		
INTERGOVERNMENT LINKS																		
HC1-1-1	3				2.1	3.0				167	242			409	49		49	458
HC1-1-2	3				2.4	3.0				176	312			488	54		54	542
HC1-1-3	3				2.4	3.0				228	346			574	54		54	628
HC1-1-4	2				1.6	2.0				276	279			555	36		36	591
SUBTOTAL	11				8.5	11.0				847	1179			2026	193		193	2219
GOVERNMENT TO PEOPLE LINKS																		
HC2-1-1	3				2.1	3.0				93	90			183	49		49	232
HC2-1-2	1				.9	1.0				381	225			606	19		19	625
SUBTOTAL	4				3.0	4.0				474	315			789	68		68	857
PEOPLE TO PEOPLE LINKS																		
HC3-1-1	4				3.6	4.0				355	717			1072	78		78	1150
HC3-1-2	2				1.8	2.0				411	435			846	39		39	885
HC3-1-3	2				1.8	2.0				485	559			1044	39		39	1083
SUBTOTAL	8				7.2	8.0				1251	1711			2962	156		156	3118
INTRAGOVERNMENT LINKS																		
HC4-1-1	3				2.4	3.0				276	419			695	54		54	749
HC4-1-2	3				2.4	3.0				335	527			862	54		54	916
HC4-2-1	3				2.4	3.0				167	242			409	54		54	463
HC4-2-2	3				2.4	3.0				276	419			695	54		54	749
SUBTOTAL	12				9.6	12.0				1054	1607			2661	216		216	2877
ENTERTAINMENT/COMMERCIAL LINKS																		
HC5-1-1	5				4.0	5.0				293	724			1017	90		90	1107
HC5-1-2	3				2.7	3.0				385	588			973	58		58	1031
SUBTOTAL	8				6.7	8.0				678	1312			1990	148		148	2138
PLANETARY																		
IL1-1-1	2				4.0					75	69			144	48		48	192
IL1-1-2	2				4.0					82	75			157	48		48	205
IL1-1-3	2				4.0	2.0				50	35			85	50		50	135
IL1-1-4	4				4.0	4.0				32	50			82	84		84	166
IL1-1-5	3				3.0	3.0				56	73			129	63		63	192
IL1-1-6	1				2.0	1.0				123	57			180	25		25	205
IL1-1-7	2				4.0					81	75			156	48		48	204
IL1-1-8	1				1.0	2.0				70	32			102	22		22	124
IL1-1-9	1				1.0	2.0				51	20			71	22		22	93
IL1-1-10	1				1.0	2.0				63	27			90	22		22	112
IL1-1-11	1				2.0					30	10			40	24		24	64
IL1-1-12	1				3.0					170	89			259	39		39	298
SUBTOTAL	21				33.0	16.0				883	612			1495	495		495	1990
LUNAR																		
IL2-1-1	1				1.0					34	9			43	34	3	37	80
SUBTOTAL	1				1.0					34	9			43	34	3	37	80

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PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				EXP	LAUNCH VEHICLE TRAFFIC			SHTL	RDTE	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
	N	R	M	D		IUS	TUG	INV			OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL		
NASA (CONTINUED)																			
EARTH RESOURCES MONITORING																			
NO1-1-1	6				.6					89	223			312	9			9	321
NO1-1-2	6				.6					57	133			190	9			9	199
NO1-1-3	4				2.8	4.0				89	153			242	66			66	308
NO1-1-4	1				.1					53	17			70	1			1	71
NO1-1-5	1				.7	1.0				26	8			34	16			16	50
NO1-1-6	1				.8	1.0				94	43			137	18			18	155
NO1-1-7	4				4.0	4.0				96	166			262	84			84	346
NO1-1-8	3				2.4	3.0				36	45			81	54			54	135
NO1-2-1	15				1.5					26	118			144	22			22	166
SUBTOTAL	41				13.5	13.0				566	906			1472	279			279	1751
ENVIRONMENTAL MONITORING																			
NO2-1-1	1				.2					113	53			166	3			3	169
NO2-1-2	4				.4					75	128			203	6			6	209
NO2-1-3	1				.1					69	29			98	1			1	99
NO2-1-4	4				2.8	4.0				80	139			219	66			66	285
NO2-1-5	1				1.0	1.0				27	9			36	21			21	57
NO2-2-1	15				1.5										22			22	22
NO2-2-2	15				1.5										22			22	22
SUBTOTAL	41				7.5	5.0				364	358			722	141			141	863
ASTROPHYSICS																			
NP1-1-1	3				2.1					88	114			202	31			31	233
NP1-1-2	4				.4					81	144			225	6			6	231
NP1-1-3	4				.4					81	140			221	6			6	227
NP1-1-4A	2				2.0	2.0				32	22			54	42			42	96
NP1-1-4B	2				1.4	2.0				32	23			55	33			33	88
NP1-1-5	3				.3					41	50			91	4			4	95
NP1-1-6	2				.2					62	52			114	3			3	117
NP1-1-7	2				.1					61	50			111	1			1	112
NP1-1-8	2				.4	2.0				19	14			33	8			8	41
NP1-2-1	15				4.5										67			67	67
NP1-2-2	15				3.0										45			45	45
NP1-2-3	15				1.5										22			22	22
NP1-2-4	1				.2										3			3	3
SUBTOTAL	70				16.5	6.0				497	609			1106	271			271	1377
SOLAR TERRESTRIAL																			
NP2-1-1	7				.7					39	101			140	10			10	150
NP2-1-2	1				.1					27	7			34	1			1	35
NP2-1-3	29				7.9	25.0				23	174			197	123	2		125	322
NP2-1-4	29				5.4					22	159			181	56	2		58	239
NP2-1-5	1				.3					112	49			161	4			4	165
NP2-2-1	11				1.1										16			16	16
NP2-2-2	11				2.2										33			33	33
NP2-2-3	11				3.3										49			49	49
NP2-2-4	27				16.2										243			243	243
SUBTOTAL	127				37.2	25.0				223	490			713	535	4		539	1252

PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				EXP	LAUNCH VEHICLE TRAFFIC			SMTL	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
	N	R	M	D		IUS	TUG	RDTE		INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	
NASA (CONTINUED)																		
LIFE SCIENCES																		
NP3-1-1	5				.5			137	314			451	7		7	458		
NP3-1-2	1				.1			137	123			260	1		1	261		
NP3-2-1	10				1.0								15		15	15		
NP3-2-2	10				.5								7		7	7		
NP3-2-3	10				.5								7		7	7		
NP3-2-4	1				.1								1		1	1		
NP3-3-1	1				.3			200	100			300	4		4	304		
SUBTOTAL	38				3.0			474	537			1011	42		42	1053		
SPACE PROCESSING-SPACE STATION																		
NS1-2-1	1				.3			200	100			300	4		4	304		
SUBTOTAL	1				.3			200	100			300	4		4	304		
SPACE INDUSTRIALIZATION																		
NS2-1-1	1				1.0			2000	1500			3500	23		23	3523		
NS2-1-2	11				11.0								165		165	165		
NS2-1-3	1				12.0			1650	1230			2880	196		196	3076		
NS2-1-4	8				24.0								312		312	312		
NS2-1-5	1				2.0								45		45	45		
SUBTOTAL	22				50.0			3650	2730			6380	741		741	7121		
ORBITAL OPERATIONS																		
NS3-1-1	6				5.4			200	450			650	81		81	731		
NS3-1-2	3				.6								9		9	9		
NS3-1-3	1				.3			100	50			150	4		4	154		
NS3-1-4	6				.6								9		9	9		
NS3-1-5	1				.5								7		7	7		
NS3-1-6	3				1.5								22		22	22		
SUBTOTAL	20				8.9			300	500			800	132		132	932		
SATELLITE POWER																		
NS4-1-1	1				.1			26	10			36	1		1	37		
NS4-1-2	1				.1			49	26			75	1		1	76		
NS4-1-3	1				.7			190	139			329	10		10	339		
NS4-1-4	10				40.0			515	5125			5640	654		654	6294		
SUBTOTAL	13				40.9			780	5300			6080	666		666	6746		
TOTAL																		
NASA	438				246.8	108.0		12275	10275			30550	4121	7	4128	34678		

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PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC		EXP	LAUNCH VEHICLE TRAFFIC		SHTL	RDTE	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
	N	R M D		IUS	TUG			INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	
OUTSIDE USERS (NON-NASA, NON-DOD)																
INTERNATIONAL COMMUNICATIONS																
CC1-1-1	4		4.0					151		151	74	64		138	289	
CC1-1-2	11		7.0	11.0			91	349		440	200			200	640	
CC1-1-3	10		6.0	10.0			102	387		489	175			175	664	
SUBTOTAL	25		17.0	21.0			193	887		1080	449	64		513	1593	
US DOMESTIC COMMUNICATION																
CC2-1-1	11		2.6	11.0			71	271		342	62			62	404	
CC2-1-2	1		1.0				53	21		74	18	16		34	108	
CC2-1-3	8		5.8	8.0			200	345		545	159			159	704	
CC2-1-4	2		1.2	1.0			37	36		73	14	1		15	88	
CC2-1-5	1		1.0				46	18		64	9			10	74	
CC2-1-6	7		1.4	7.0			47	127		174	35			35	209	
CC2-1-7	6		1.2	6.0			37	80		117	30			30	147	
CC2-1-8	2		.4	2.0			46	38		84	10			10	94	
CC2-1-9	3		.6	3.0			41	50		91	14			14	105	
CC2-1-10	9		6.6	9.0			100	360		460	180			180	640	
CC2-1-11	2		1.4	2.0			76	66		142	39			39	181	
CC2-1-12	6		4.4	6.0			105	257		362	121			121	483	
CC2-1-13	1		.2	1.0			48	18		66	5			5	71	
CC2-1-14	7		1.4	7.0			40	97		137	35			35	172	
SUBTOTAL	66		29.2	63.0			947	1784		2731	731	18		749	3480	
FOREIGN COMMUNICATION																
CC3-1-1	2		.4	2.0			40	33		73	10			10	83	
CC3-1-2	4		.8	4.0			44	70		114	20			20	134	
CC3-1-4	2		.4	2.0			40	31		71	10			10	81	
CC3-1-5	4		.8	4.0			40	61		101	20			20	121	
CC3-1-6	1		1.0				39	13		52	9	1		10	62	
CC3-1-7	6		1.2	6.0			40	86		126	30			30	156	
CC3-1-8	1		1.0				91	42		133	18	16		34	167	
CC3-1-9	4		2.8	4.0			91	152		243	77			77	320	
CC3-1-10	1		.2	1.0			42	17		59	5			5	64	
CC3-1-11	1		1.0				20	5		25	9	1		10	35	
CC3-1-12	1		.2	1.0			35	11		46	5			5	51	
CC3-1-13	2		.4	2.0			40	31		71	10			10	81	
CC3-1-14	4		.8	4.0			43	68		111	20			20	131	
CC3-1-16	4		.8	4.0			64	102		166	20			20	186	
CC3-1-17	3		.6	3.0			39	46		85	14			14	99	
CC3-1-18	7		1.4	7.0			47	119		166	35			35	201	
CC3-1-20	2		.4	2.0			38	30		68	10			10	78	
CC3-1-21	2		.4	2.0			39	31		70	10			10	80	
CC3-1-22	3		.6	3.0			41	48		89	14			14	103	
CC3-1-23	2		.4	2.0			46	38		84	10			10	94	
CC3-1-24	2		.4	2.0			48	39		87	10			10	97	
CC3-1-26	6		1.2	6.0			67	157		224	30			30	254	
CC3-1-28	1		.2	1.0			20	5		25	5			5	30	
CC3-1-30	3		1.4	2.0			46	58		104	44	3		47	151	
CC3-1-32	3		.6	3.0			48	58		106	14			14	120	
CC3-1-33	1		.2	1.0			39	13		52	5			5	57	
CC3-1-35	3		.6	3.0			67	83		150	14			14	164	

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PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

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SATELLITE NAME	PAYLOAD TRAFFIC N R II D	EXP	LAUNCH VEHICLE TRAFFIC		SHTL	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
			IUS	TUG		ROTE	PAYLOAD COSTS			INV	OPS	LOSS	TOTAL	
OTHER USERS (CONTINUED)														
FOREIGN COMMUNICATION (CONT.)														
CC3-1-36	3	.6	3.0			45	46		91	14			14	105
CC3-1-37	5	1.0	5.0			67	130		197	25			25	222
CC3-1-38	4	.8	4.0			41	63		104	20			20	124
CC3-1-39	6	1.2	6.0			70	163		233	30			30	263
CC3-1-40	4	.8	4.0			46	73		119	20			20	139
SUBTOTAL	97	24.6	93.0			1523	1922		3445	587	21		608	4053
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN														
CO1-1-1	3	.3				82	114		196	6			6	202
CO1-1-2	3	3.0				52	70		122	27	2		29	151
CO1-1-3	8	1.6	8.0			68	206		274	39			39	313
CO1-2-1	2	.2				108	104		212	4			4	216
SUBTOTAL	16	5.1	8.0			310	494		804	76	2		78	882
EARTH AND OCEAN MONITORING														
CO2-1-1	18	4.6				275	1091		1366	87			87	1453
SUBTOTAL	18	4.6				275	1091		1366	87			87	1453
EARTH RESOURCES-US DOMESTIC AND FOREIGN														
CO3-1-1	21	1.8				66	443		509	34			34	543
CO3-1-2	4	.4				66	114		180	8			8	188
CO3-1-3	2	1.4	2.0			59	60		119	39			39	158
CO3-1-4	2	1.4	2.0			59	60		119	39			39	158
CO3-2-1	2	.2				65	62		127	4			4	131
CO3-2-2	2	.2				66	61		127	4			4	131
CO3-2-3	1	.1				32	12		44	2			2	46
CO3-2-4	5	.5				64	130		194	9			9	203
CO3-2-5	2	1.4	2.0			56	52		108	39			39	147
CO3-2-6	1	.7	1.0			59	29		88	19			19	107
SUBTOTAL	42	8.1	7.0			592	1023		1615	197			197	1812
WEATHER														
CO4-1-2	8	8.0				69	211		280	16	40		56	336
CO4-1-3	8	.8				84	226		310	15			15	325
CO4-2-2	4	.8	4.0			55	92		147	20			20	167
CO4-2-4	4	2.8	4.0			66	113		179	77			77	256
CO4-2-5	5	3.5	5.0			66	136		202	96			96	298
SUBTOTAL	29	15.9	13.0			340	778		1118	224	40		264	1382
US DOMESTIC														
CP1-1-1	12	1.2				101	222		323	23			23	346
SUBTOTAL	12	1.2				101	222		323	23			23	346
FOREIGN														
CP2-1-3	1	1.0				40	14		54	9	1		10	64
CP2-1-5	3	1.2				36	41		77	13	1		14	91
CP2-1-6	4	.4				40	62		102	8			8	110
CP2-1-7	8	5.6	8.0			30	77		107	155			155	262
CP2-1-8	7	4.9	7.0			33	82		115	136			136	251
CP2-1-14	1	1.0				29	9		38	9	1		10	48
CP2-1-15	1	1.0				19	5		24	9	1		10	34
CP2-1-16	14	14.0				53	244		297	124	8		132	429
SUBTOTAL	39	29.1	15.0			280	534		814	463	12		475	1289

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PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC N R M D	EXP	LAUNCH VEHICLE TRAFFIC		SHTL	RDTE	PROGRAM COSTS				LAUNCH VEHICLE COSTS				PROG TOTAL
			IUS	TUG			PAYLOAD COSTS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL		
OTHER USERS (CONTINUED)															
DISASTER WARNING															
CS1-1-1	4	.8	4.0			81	135			216	20			20	236
SUBTOTAL	4	.8	4.0			81	135			216	20			20	236
TRAFFIC MANAGEMENT															
CS2-1-1	3	2.1	3.0			42	52			94	58			58	152
CS2-1-2	3	2.1	3.0			47	57			104	58			58	162
CS2-1-3	4	2.8	4.0			62	95			157	77			77	234
SUBTOTAL	10	7.0	10.0			151	204			355	193			193	548
SPACE MANUFACTURING-US DOMESTIC AND FOREIGN															
CS3-1-1	86	4.8									91			91	91
CS3-1-2	4	.3									6			6	6
CS3-1-3	2	.2									4			4	4
CS3-1-4	34	2.3									44			44	44
CS3-2-1	20	1.2									23			23	23
CS3-2-2	5	.3									6			6	6
CS3-2-3	2	.2									4			4	4
CS3-2-4	34	2.3									44			44	44
CS3-2-5	12	1.2									23			23	23
SUBTOTAL	199	12.8									245			245	245
USERS TOTAL															
OUTSIDE	557	155.4	234.0			4793	9074			13867	3295	157		3452	17319
ALL PROGRAMS															
TOTAL	***	863.2	515.0			20928	39367	121		60416	13990	456		14446	74862

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